

INCLUSIVE & REHABILITATIVE ENVIRONMENT

THE APPLICATION OF UNIVERSAL DESIGN PRINCIPLES TO REHABILITATE
MAINSTREAM SOCIETY'S ATTITUDE TOWARD DISABILITIES & ACCESS.

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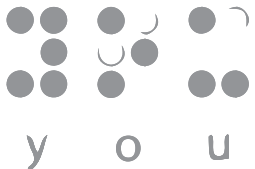
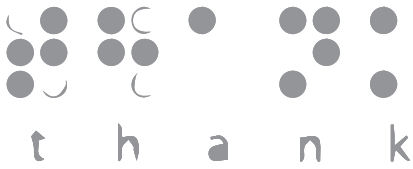
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Many thanks to the various people and NGO organisations I have met along the way for their support and assistance in my research, explorations and training as an architect. It is a privilege to meet inspiring people who taught me about dignity, equity and being human despite all the difficulties of being a person with a disability. I dedicated this dissertation to you all and I hope it will inspire you in turn.

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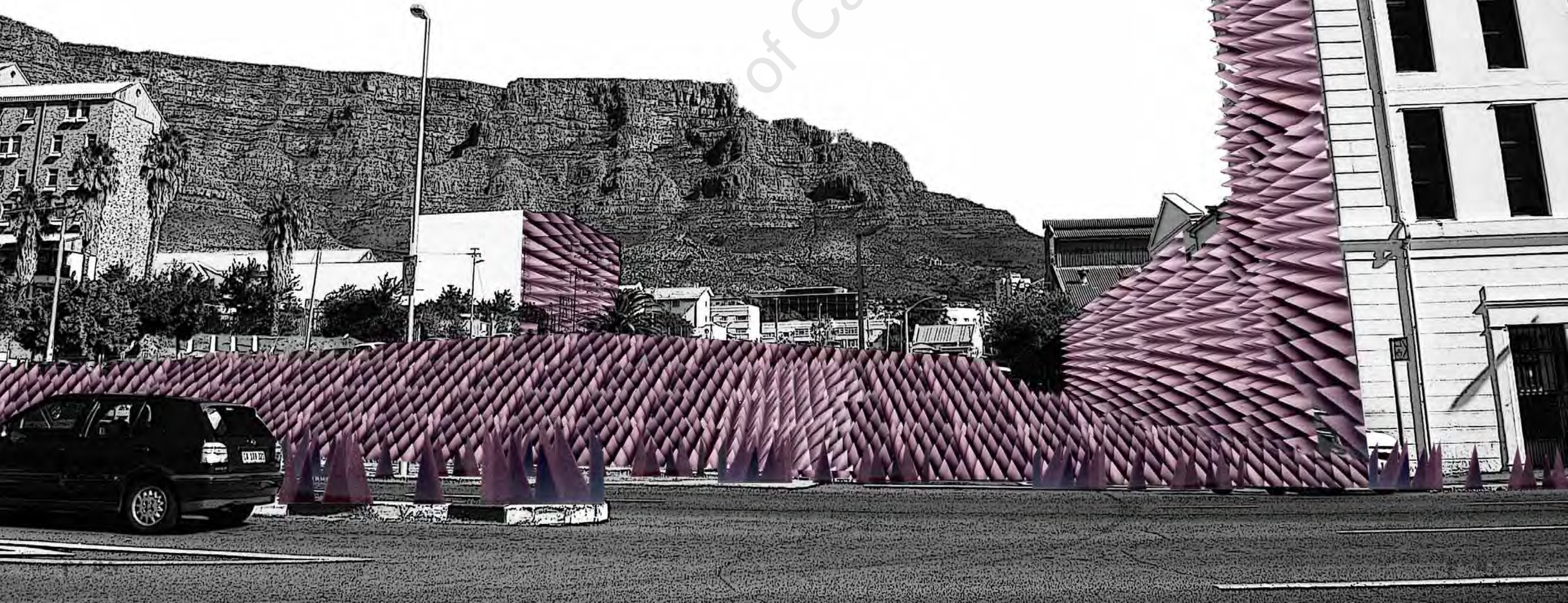


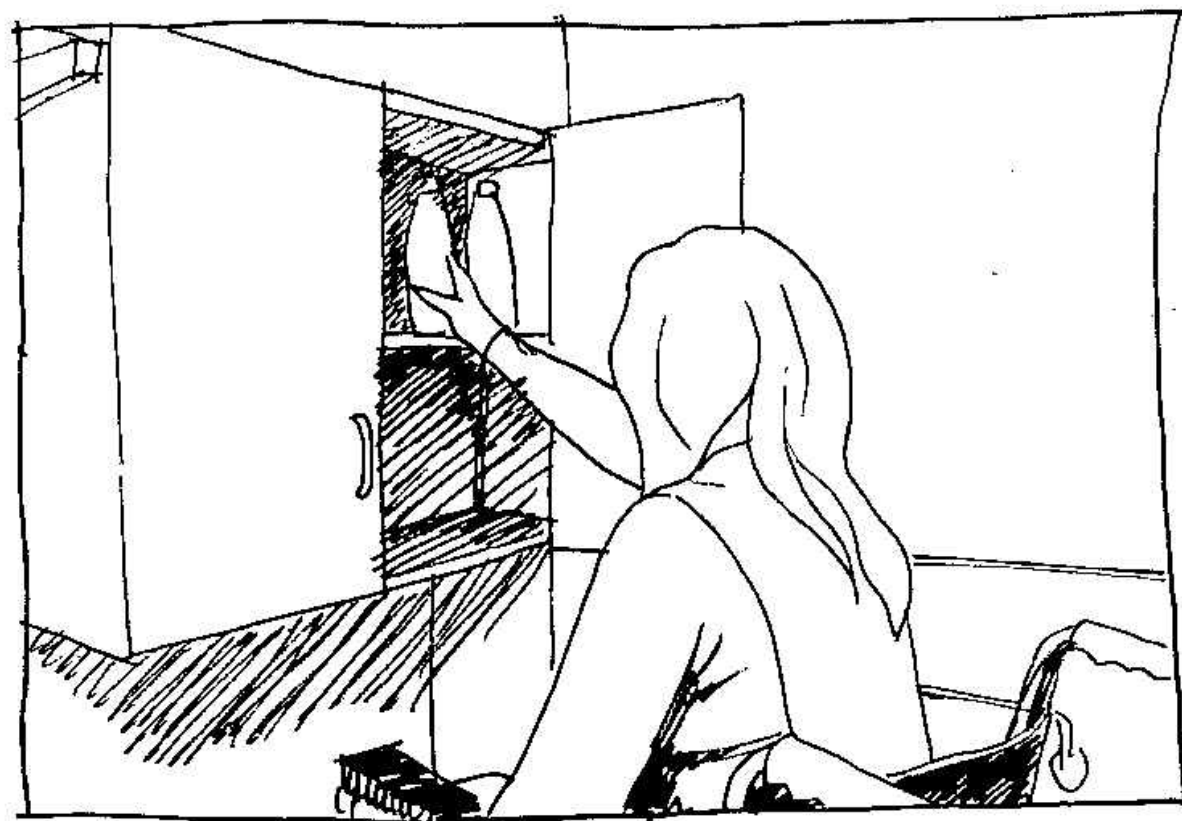
ABSTRACT

The design dissertation focuses on the principles of Universal Design and the spatial challenges people with disabilities face within the built environment beyond wheelchair access. The product of the research is an Extra-Sensory Expo located on the fringe of Cape Town CBD district. The building is designed to provide multi-sensory experiences and turn the tables on society's attitudes toward people with disabilities.



CAPE TOWN





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THE DEAF ARCHITECT

INTRODUCTION

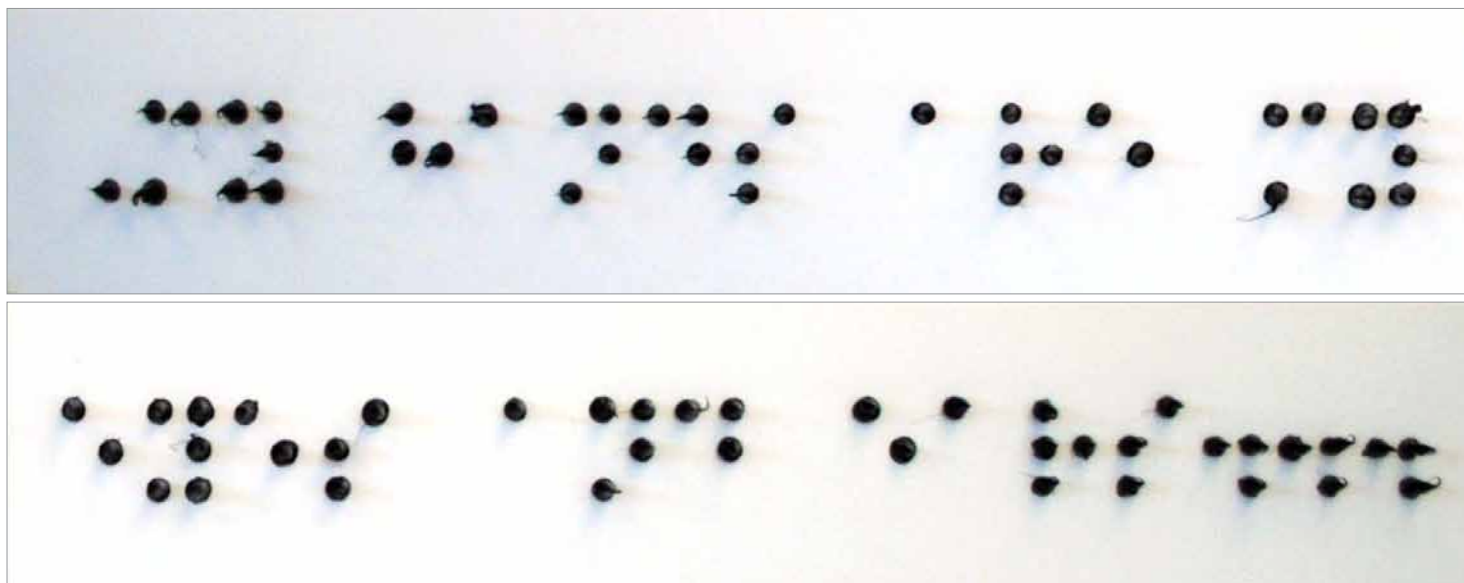
This “Inclusive and Rehabilitative Environment” dissertation focuses on the application of Universal Design principles and changing attitudes toward people with disabilities in the built environment. The choice of research subject is partly influenced by my disability as a profoundly deaf person and as a bilateral cochlear implant user as well as from my exposure to the spatial challenges people with disabilities face in the built environment.

Cape Town's built environment was designed and constructed with no reference to the needs of people with disabilities and the ageing population (Davies, 2013; Thompson 2013). It continued to perpetuate the social and attitudinal barriers toward disabilities despite recent attempts and policies at improving accessibility (Daniels, 2013; Opperman, 2013, Mycroft, 2013). There are few buildings in Cape Town that are accessible but most of them are restricted to institutional typologies. In addition, the research focus is further motivated by the following points:

- There is a lack of relevant and updated resources on Universal Design in South Africa compared to First World countries (Davies; 2013; Lehohla, 2005; Opperman, 2013; Thompson; 2013).
- The recently updated section of the National Building Regulation SANS 10400, Part S: Facilities for persons with disabilities, is a significant advancement for the rights of people with disabilities. Granted, the legal frameworks, policies and guidelines are theoretically in place. They are seldom applied in practice and are often not enforced (Thompson, 2013).
- There is a lack of understanding on applying accessibility features to suit the local context compared to international examples (Daniels, 2013; Davies; 2013).

The dissertation is not an attempt at designing an accessible building to demonstrate the best practice for Universal Design. My research and interactions with people with disabilities and consultants revealed that an accessible environment or building is only possible by educating and changing attitudes toward disability issues (Daniels, 2013; Davies; 2013, Mycroft, 2013).

Therefore, the dissertation aims to change our understanding and attitudes toward people with disabilities through the social relation of the research and design processes. Furthermore, the product of the dissertation is a multi-sensory building that challenges all users' perception of spaces and access by placing restrictions on their functional capabilities. For instance, the building users will dine in the dark in order to understand how blind and visually-impaired people overcome their functional limitations.



1.1. Initial representation of an idea for M.Arch dissertation research. The tactile message read "My hand are my eyes and ears". Silicone on triplex board.



1.2. Model representation of spatial challenges.



1.3. Cochlear Implant (www.cochlear.com)

BRIEF BIOGRAPHY

My full name is Hiten Mohanlal Bawa and I was born a healthy baby in 1988. My permanent disability might have been caused by mumps I contracted as a toddler. But, no one knows exactly when I lost my hearing until I reached the age when most babies start acquiring speech and language. Therefore, my grasp of language was delayed and I was put through a lifetime of rehabilitation and therapies together with hearing aids to learn oral language.

I grew up in a hearing environment because I am the only deaf person in my extended family. I attended mainstream schools without learning Sign Language or being immersed in the Deaf Culture. I wore hearing aids for 17 years and then switched over to cochlear implant technology in 2006 to address my limited hearing and communication skills.

Briefly a cochlear implant is an innovative assistive technology that enables me to hear very well and speak clearly. A cochlear implant has 3 parts:

- A** The external speech processor picks up sounds and convert them into electronic signals.
- B** The transmitter relays the electronic signals to the internal implant
- C** The internal implant transmits the signals through the electrodes in the cochlea, an organ of the inner ear. The electric signals are then picked up by the auditory nerves and interpreted as sounds.

Basically the cochlear implant bypasses the damaged parts of the ear and provides the sense of hearing without amplifying sounds like hearing aids do. Seven years of rehabilitation and therapies followed after the operations to ensure maximum benefits from the implants.

My hearing range has improved dramatically and is said to be close to the normal hearing range. Since then the cochlear implants have changed my life and helped me reach my fullest potential as an independent adult. Without the implants, I would not have survived the rigor of tertiary education.

The struggles and challenges I face are another story. Even though the cochlear implants have changed my life completely, there are disadvantages that people with hearing loss have to deal with, namely discriminations, communication barriers, language and poor acoustics.

My disability is not an isolated case and there are many people that have varying disabilities and share the same problems that I faced on a daily basis. The challenges face by people with disabilities are varied depending on the individual's circumstances. Some of the challenges are linked to the built environment (Lifechez, 1987; Clarkson, et al., 2003).

This dissertation is not about me. It is about people with disabilities like me whose challenges are not appreciated and understood by the built environment professionals. This led me to investigate the concept of Universal Design and its relevance to local context.

CREATIVE TRANSMUTATIONS

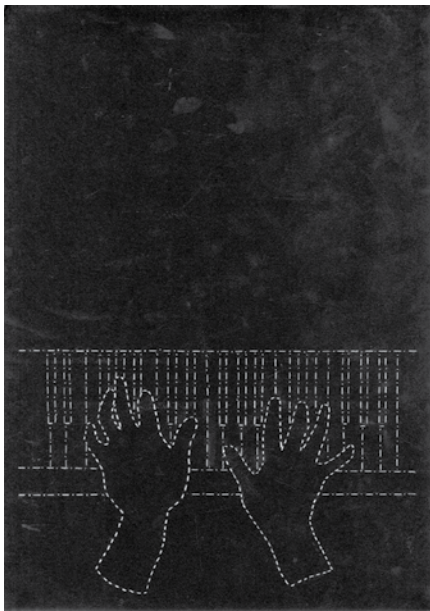
A design exercise called Creative Transmutations was initiated before the start of the research process. The creative transmutations were an exercise in exploring the initial idea of disability issues (Fig 1.1) through systematic and creative engagement. It was conducted as a game that involves the initial artefact over the period of 10 days.

The rule of the game is simple as it consists of different tasks grouped under seven categories. A task must be chosen randomly from a category that suit the initial idea. An instruction is applied to the idea in order to transform it. This game was played four times creating four different transmutations of the initial idea. The resulting transmutations explore ideas around the perceptions of people with disabilities and their representation in popular media.

Art & Literature

"The position of the whale's eyes corresponds to that of a man's ears; and you may fancy, for yourself, how it would fare with you, did you sideways survey objects through your ears." Herman Melville, Moby Dick.

A whale cannot see in deep, dark oceans, so they used echolocation to help with navigation and detecting preys. They have another sense to compensate for their lack of vision.

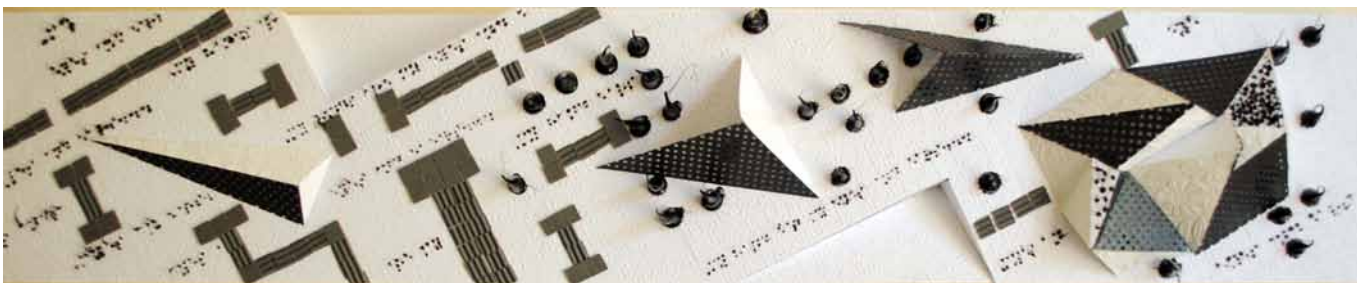


1.4.



2 Geography

Remake and transform your artefact as a deposition of sedimentary layers.



1.5.

3 Science and Nature

Your artefact needs a coat and a hat. It needs protection. Can you make this from its opposite?

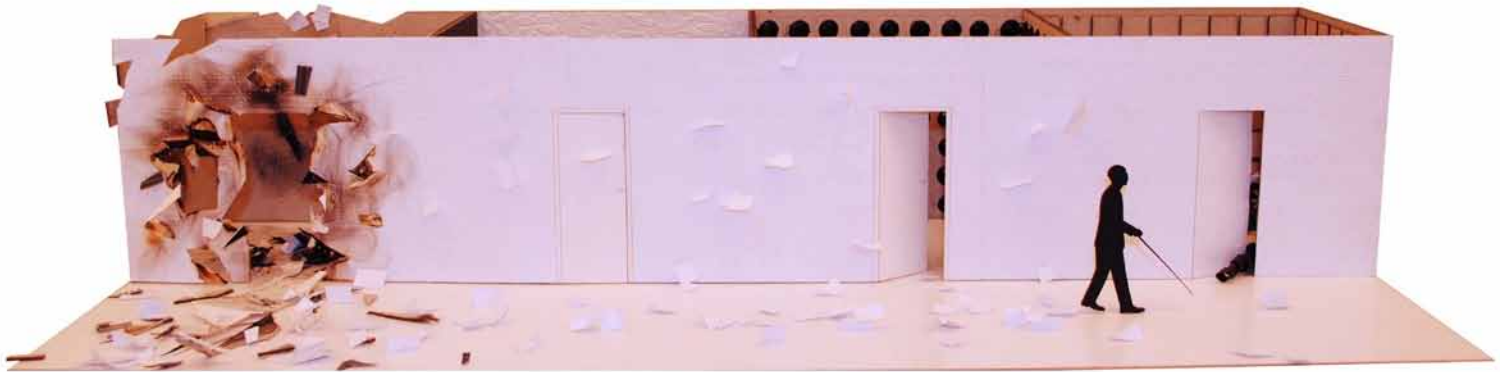


1.6.

4 Entertainment

Terry Gilliam's Brazil walls are never what they seem. Capture this spirit of Gilliam's Brazil in your artefact.

The sci-fi/ fantasy movie has a story line that is similar to George Orwell's novel titled "1984". It is about a protagonist who tried to dodge the totalitarian government in order to rescue the woman of his dreams.



1.7.

WHAT IS UNIVERSAL DESIGN?

Universal Design is defined by the United Nations as followed: "Universal design" means the design of products, environments, programmes and services to be usable by all people, to the greatest extent possible, without the need for adaptation or specialized design. "Universal design" shall not exclude assistive devices for particular groups of persons with disabilities where this is needed (United Nations, 2008).

Universal Design is an integrated philosophy about equity and quality for everyone rather than being a disability issue (Imrie & Hall, 2001). The best examples of Universal Design features or products are those that are seamless within the overall design solutions and are used by a widest range of people as possible (Lifechez, 1987).

These design solutions follow the seven well-known principles of Universal Design (NCSU, 2012):

1. Equitable Use

The design is useful and marketable to people with diverse abilities.

2. Flexibility in Use

The design accommodates a wide range of individual preferences and abilities.

3. Simple and Intuitive Use

Use of the design is easy to understand, regardless of the user's experience, knowledge, language skills, or current concentration level.

4. Perceptible Information

The design communicates necessary information effectively to the user, regardless of ambient conditions or the user's sensory abilities.

5. Tolerance for Error

The design minimizes hazards and the adverse consequences of accidental or unintended actions.

6. Low Physical Effort

The design can be used efficiently and comfortably and with a minimum of fatigue.

7. Size and Space for Approach and Use

Appropriate size and space is provided for approach, reach, manipulation, and use regardless of the user's body size, posture, or mobility.

According to Imrie & Hall, the social relation of development and design processes of Universal Design are much more than the technical response to the needs of people with disabilities (Imrie & Hall, 2001). It prioritizes the end-users' views and values and seek to challenge the social, institutional and technical relations of design and building processes. During the design process, Universal Design concerns itself with meaning and context of the building, it is human orientated through identifying and encouraging participation of end-users (Imrie & Hall, 2001; Clarkson, et al., 2003). Moreover, it seeks to change design attitude and use low cost design solutions through the use of appropriate technology and alternative models of the developmental process (Imrie & Hall, 2001; Lifechez, 1987). Lastly, Universal Design promotes heterogeneity in design solutions rather than homogeneity (Imrie & Hall, 2001).

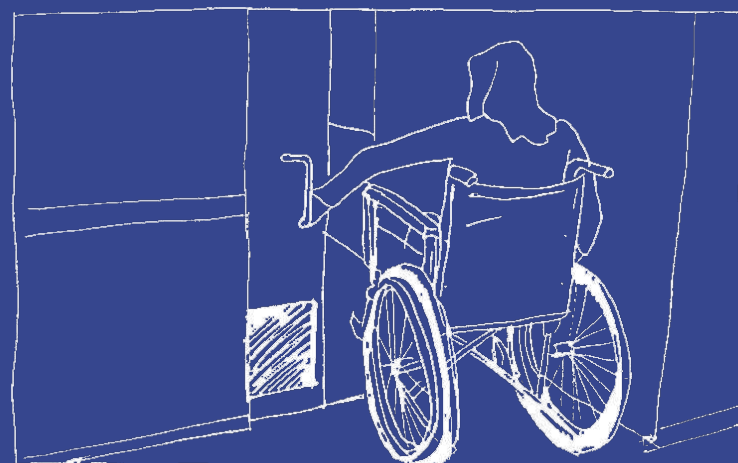
Involving Universal Design in the design process has its own dangers (Thompson, 2013). It can be applicable to a limited range of products and cannot be applicable or appropriate to situations such as blind drivers of motor cars or a bicycle (McAdams & Kostovich, 2011; Pullin, 2009). It should not be thought of as an add-on or afterthought at the end of the design process. Other dangers of Universal Design are (Jacobs, 2008; Newell et al., 2011):

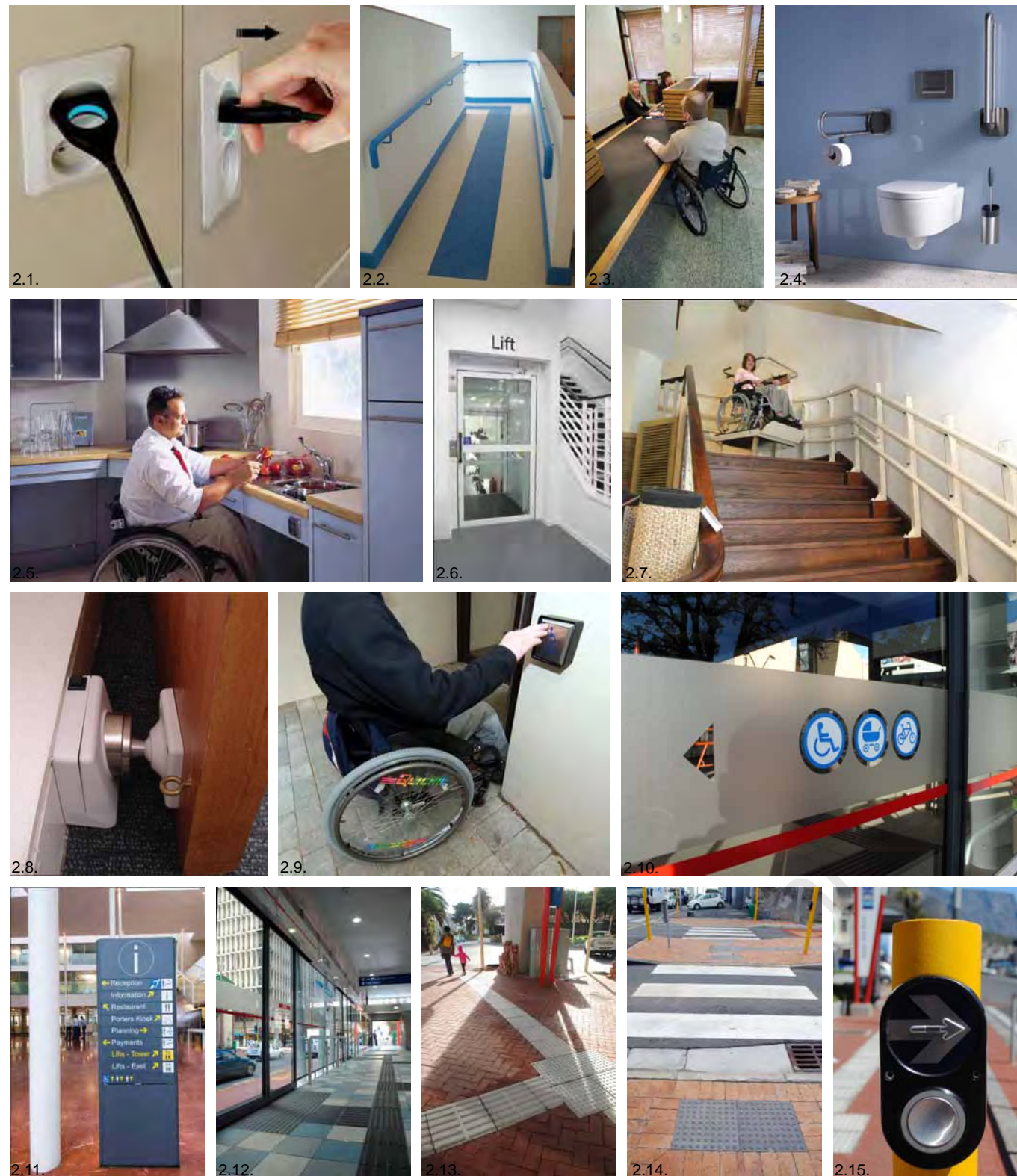
1. It can lead to increased costs and inappropriate compromises.
2. It tends to patronise older people and people with disabilities.
3. It is rarely possible to design a product that is truly accessible to all potential users. This is true when designers think of people with severe disabilities which requires bespoke designs solutions rather than a one-size-fit-all solution.

Universal Design can make simple products universally accessible through parametric changes, whereas more complex products require the input of a team of experts such as occupational therapists, ergonomists, engineers, interaction and industrial designers to develop functional additions and changes (McAdams & Kostovich, 2011).

WHAT IS UNIVERSAL DESIGN?

Universal Design was coined by Ronald L. Mace, a researcher at North Carolina State University, USA, to define "the design of products and environments to be usable by all people, to the greatest extent possible, without adaptation or specialized design" (Imrie & Hall, 2001; Clarkson, et al., 2003).





2.1-15. Examples of Universal Design application in the built environment.

WHY IS UNIVERSAL DESIGN RELEVANT IN SOUTH AFRICA?

‘The physical environment has been constructed without reference to the need of people with disabilities’ (Imrie & Hall, 2001).

Universal Design is becoming more relevant in Third World countries such as South Africa where a large proportion of the global population of people with disabilities are found. There are no reliable statistics or census on people with disabilities and the UN estimated that 10% of the global population is living with disabilities and 80% of them are living in developing countries (Lehohla, 2005; United Nations, 2008). If the UN’s estimation is applied to South Africa, we will probably have 5 million people with disabilities and possibly more.

With the large population of people with disabilities and an ageing population, our built environment is expected to be accessible and free of barriers. People with disabilities are protected by the Constitution of the Republic of South Africa, 1996 (Act No. 108 of 1996). There are extensive policies and legal frameworks in place such as the recently updated section, Part S: Facilities for persons with disabilities in the National Building Regulation SANS 10400. However, very little is being applied in practice and the local built environment remains inaccessible to the majority of the population and not just people with disabilities (Daniels, 2013; Opperman, 2013, Thompson; 2013, Mycroft, 2013).

Developing countries, like South Africa, lagged behind leading First World countries on issue of accessibility in the built environment (Lehohla, 2005). Few attempts were made in making our environment accessible, such as installing drop-kerbs, Bus Rapid Transit (BRT) systems, tactile ground surface indicators (TGSIs), but most of them fell short of international standards and are ineffective due to many factors. These factors range from a lack of proper application of Universal Design features and strategies, to lack of awareness on what is available to people with disabilities and to the social and attitudinal barriers perpetuated by the built environment professionals (Daniels, 2013; Davies, 2013; Mycroft, 2013).

The most common assumptions made by the built environment professionals and designers are (Imrie & Hall, 2001):

1. There is insufficient demand expressed by people with disabilities for an accessible built environment.
2. That the provision of accessible buildings and environment is prohibitively expensive.
3. That the provision of accessible design for the needs of wheelchair users is sufficient
4. Accessible environments can be provided by recourse to technical design solutions without any corresponding change to social-cultural attitude and practices.

These common assumptions are also supported by my interviews and interactions with consultants and people with disabilities (See Appendix I).

There are substantial resources on Universal Design in the academic fields including policies, guidelines and legal frameworks. These resources were conducted and confined to First World countries of USA, Canada, UK, Japan, Australia, New Zealand and few European countries. In addition, most of the universally designed products and research fall into the realms of industrial design, furniture design, biomedical engineering and occupational therapy (Olguntürk & Demirkan, 2009). Very few were developed architecturally despite the availability of resources and guidelines for architectural design (McAdams & Kostovich, 2011). Most architectural case study examples encountered were restricted to housing, schools and institutional buildings. Imrie & Hall stated that there are “few buildings that provide appropriate design features and navigational aids to enable people with a range of sensory impairments to move around with confidence and ease” (Imrie & Hall, 2001).

Whilst these resources are valuable for architects and designers, there is a noticeable absence of information on the application and success of Universal Design strategies and features in the Third World contexts such as South Africa. Additionally, there is little to no attempt at challenging the social-cultural attitude in mainstream society and fostering integration of people with disabilities (Lehohla, 2005; Mycroft, 2013).

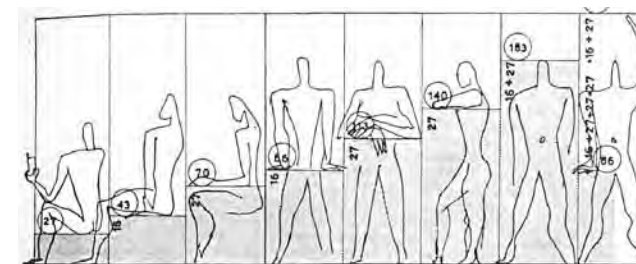
ARCHITECTURE, DISABILITIES & THERAPY

ARCHITECTURE, DISABILITIES & THERAPY

Mainstream society, architects and designers in particular, need to be exposed to disability and ageing issues during their training in order to understand the physiological and emotional needs of building users and aid in creating humane environment (Fischer & Meuser, 2009). One cannot fully understand issues and challenges around disabilities from reading guideline manuals like the National Building Regulation SANS 10400 or international guidelines and make common assumptions.

Exposure to people with disabilities in the design process will teach society that we regard ourselves as 'normal' with our own problems and functional limitations rather than as 'disabled' in the sense of being unable to function normally (Music Within, 2007; Boys, 2012). 'Disability' is socially defined and constructed, in other words, it is society that is at fault for marginalising people with disabilities (Imrie & Hall, 2001; Mycroft, 2013). Disability is not a physical constraint, it relates to a situation where access is about attitudes, language, and control of the environment (Imrie & Hall, 2001; Lifechez, 1987).

We, people with disabilities, are humans though our bodies have functional limitations. Our bodies do not conform to the ideals of Classical thinking of the European-looking, male or female body with a height of 1828.8mm or six feet tall. This idealistic body is used by architects as a mathematical standard to measure ourselves against the metric system in order to create a human-scaled environment (Corbusier, 1973; Pallasmaa, 1996). The issue with this ingrained architectural mind-set is that it disregards human conditions, the bodily senses and the varied disabilities beyond a wheelchair. It does not aid in creating a humane environment.



3.1. Le Corbusier's The Modular system (Corbusier, 1973).

THE DISABLED BODY

A disabled body in architecture had been reduced to a single mobility impairment of a wheelchair user (Imrie & Hall, 2001). This is evident in metric handbooks which detail the ergonomics of a wheelchair in plan and elevations without any reference to the person in a wheelchair (McDonald, 2013, Mycroft, 2013). They

create an impression that all people with disabilities are wheelchair users and a wheelchair-friendly building is achievable by conforming to standard measurements of ramps, lifts and circulation areas (Hannah & Covington, 1997). Furthermore, there are no standard measurements on how to address the spatial challenges of a blind person, a deaf person, a person with cerebral palsy, or a person with cognitive disability.

There are new SANS 10400 building regulations that cover the provisions for people with disabilities beyond wheelchair access which show an improvement in understanding accessibility requirements and issues (Davies, 2013; Thompson, 2013). The regulations set minimum requirements for functional accessibility and expand on anthropometric and ergonomic requirements. However, they do not challenge discriminatory attitudes or provide detailed information on intangible qualities to respond to the range of human conditions and sensory needs.

The disabled body does not fit into Le Corbusier's Modulor theory and belief of designing a human-scaled environment based on the mathematical relationship and harmony of a human body within a space (Corbusier, 1973; Unwin, 1997). This is because the disabled body is an antithesis of the Classical ideals of the perfection and beauty of a healthy body (Unwin, 1997; Boys, 2012). It is assumed that the disabled body breaks with the harmonious proportions of a human body and this is reflected by society's tendency to marginalise and institutionalise people with disabilities in dedicated housings, schools and care centres (Pullin, 2009; Wanenchak, 2012).

A good example of a disabled body that challenged the notion of what a human body constitutes of is Marc Quinn's 11 ton Carrara marble sculpture of a heavily pregnant Alison Lapper. Alison Lapper has phocomelia, a condition that resulted in her being born with no arms and shortened legs (Pullin, 2009; Lapper, 2005). The sculpture was placed on Trafalgar Square for eighteen months among other historical, militaristic and male sculptures. Art critics stated that the sculpture brings to mind the classical statues and ruins excavated from the past which are disfigured by accident or design and became a subtle reference to disabilities whilst at the same time presenting an element of idealism in a disabled body (Pullin, 2009).

Disability is nothing to be ashamed of and people should be more accepting of their less than ideal bodies (Equivica, 2013; Lifechez, 1987; The Butterfly Circus, 2011). In addition, the shock from the exposure to a disabled and pregnant body of Alison Lapper has challenged society's perceptions of disabilities. We can learn from Alison Lapper's personal story that she is proud of her bodily difference rather than seeing herself

as disabled (Lapper, 2005). Her story also teaches that designers need to place the person first rather than the wheelchair or the different categories of disabilities in the design process (Lapper, 2005; Wanenchak, 2012).

Based on extensive interviews with a wide range of people with disabilities (see Appendix I), I have learnt that each person's spatial experiences are conditioned by their personality and perceptions. As an example, the spatial experience of a paraplegic person is different from that of a visually-impaired person, who is different from a blind person or someone with cognitive disability. The reason is that each person relies on other functional abilities or skills to compensate their limitations which lend a different spatial experience (Davies, 2013; Daniels, 2013; Lifechez, 1987; Opperman, 2013). A blind person may rely on a heightened sense of hearing and non-visual cues to help with orientation and mobility which contrast with a deaf person's sensitivity to lights, movements and reliance on visual clarity for communication (Children of a Lesser God, 1986; My Deaf Family, 2010; Wait Until Dark, 1967).

It can be said that people with disabilities rely on intangible spatial qualities to compensate for functional limitations within a space. Most of us rely on assistive technologies to overcome functional limitations or learn a skill to overcome spatial limitations such as echolocation (Pullin, 2009; Wanenchak, 2012). It is true that a blind boy, named Ben Underwood, learnt the skill of locating the object and the associated qualities of size, height, and distance by reflecting sounds (Equivicae, 2007). Ben was one of few people who developed echolocation to his advantage in navigating his surroundings and take part in activities like skating, cycling and playing video games unaided. But, architect and designers need to understand that the bodily adjustments or skills of individuals take years of practice and rehabilitation to be heightened or become ingrained coping mechanisms (Diaconu et al., 2011; Lifechez, 1987).



3.2. Ben Underwood (Equivicae, 2007)

The coping mechanisms and assistive technologies do not necessarily make a 'disabled' body superior to a 'normal' human body as it can fail in situations when the mechanisms are hampered by the spatial conditions imposed on the body.

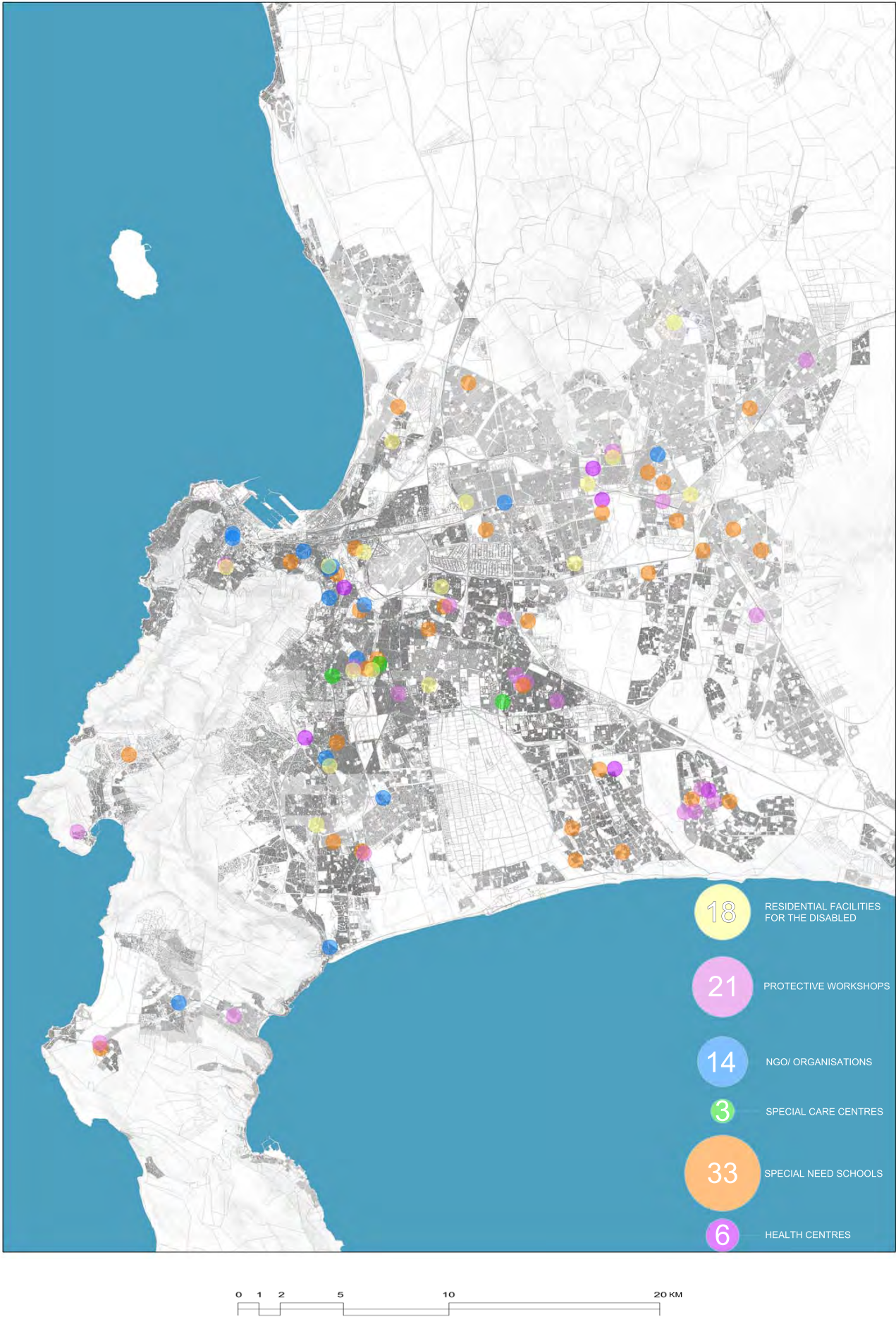
DISABLED ARCHITECTURE

We confront the physical environment with our bodies and with all our senses rather than confront it with our eyes (Diaconu et al., 2011; Pallasmaa, 1996). We use our physical bodies to enter a space; our eyes reach into the space; our ears to receive the sounds; our skin to test the mood; our nose to smell for attractions or danger and our tongue to taste the air. The human body is not neutral in a space and is constantly affected by the spatial conditions and design of the building (Pallasmaa, 1996).

The architecture that disables the senses or exposes the functional limitations of a human body by causing personal discomfort and stress reflects the disabling views of the built environment professions (Clarkson et al., 2003, Imrie & Hall, 2001). The disabling values and attitudes perpetuated by the built environment professionals are subtle. They can be either imposed intentionally by wilful neglect, deliberate evasion or unconsciously with a lack of consideration to the end-users needs (Lifechez, 1987).

Subtle elements can be intangible such as poor acoustic or lighting levels that can make conversations and communication difficult resulting in awkward situations for both people with hearing loss and hearing people. Some disabling aspects are intentional like round door knob or a minimalist staircase without any handrails which sacrificed the functional and safety principles for aesthetic and appearance. Such features and inaccessible buildings are the result of thoughtless and inappropriate design underpinned by a development process which lacks knowledge of, and is insensitive to the needs of a wide range of people (Imrie & Hall, 2001).

These poor designs and inaccessible buildings create dull, confusing and uncomfortable spaces for a human body. There are few accessible buildings that provide “appropriate design features and navigational aids to enable people with a range of sensory impairments to move around with confidence and ease” (Imrie & Hall, 2001). These buildings are possible by including the views of a wide range of people including people with disabilities in the design and development process (Fischer & Meuser, 2009).



3.3. Mapping of the social and institutional facilities for people with disabilities in Cape Town.



"To be an architect, one has to developed an intellectual and emotional understanding of people. Architecture should not sacrifice functional concerns for aesthetic vision and self-expression."

Raymond Lifechez, 1987.

CEREBRAL PALSY

ASPERGER SYNDROME

LEARNING DIFFICULTIES

DOWN SYNDROME

AUTISM

BLIND & VISUALLY IMPAIRED

SPINAL INJURIES

DEAF
HARD-OF-HEARING
COCHLEAR
IMPLANTS

DISABLED PERSPECTIVES

The grass-root design approach, through active participation and interactions among people with disabilities, can help the built environment professionals with feedback and insights into the human conditions. Often there are assumptions made about disabilities and the tendency to rely on accessibility guidelines which place too much emphasis and focus on the end product, rather than educating and challenging attitudinal barriers (Lifechez, 1987; Mycroft, 2013).

People with disabilities have different perceptions of their environment from those of able-bodied people. They may notice things that others take for granted and are more likely to respond to spatial constraints that expose their disabilities (Equivica, 2007; The Deaf Family, 2008; Lifechez, 1987). For example, Vincent Daniels is blind and he prefers to hold conversations in a quieter room when background noise interferes with his limited hearing sense (Daniels, 2013). He indicated that he is legally blind, but is also hearing impaired which disproves the common assumption that all blind people have better sense of hearing.

There is an assumption among architects that most blind people are aware of and use TGS (Davies; 2013; Thompson, 2013). This has been disproved by blind and visually-impaired people citing lack of exposure, understanding and spread of tactile tiles in the townships (Daniels, 2013, Interviewee 2, 2013; Interviewee 4, 2013; Interviewee 7, 2013). Tactile tiles are relatively new in developing countries like South Africa and are limited to few urban areas and public transportation nodes.

Daniels explained that without tactile tiles, blind and visually-impaired people do not "stumble around" in the dark. Instead they take their time to familiarize themselves with their environment by memorizing fixed features or landmarks to aid with orientation and mobility (Daniels, 2013; Interviewee 2, 2013). In addition, they rely heavily on non-visual cues such as auditory perceptions, changes in air pressure to a lesser degree, olfactory sensations and temperature gradients

(Daniels, 2013; Lifechez, 1987). A mobility-trained blind person learns to "substitute these nonvisual inputs for visual ones in assembling an effective cognitive map" (Lifechez, 1987).

These insights coming from a blind person teach that the changes in the built environment need to be consistent for familiarity and that non-visual cues are important for identification.

Beside sensory and motor impairment, people with emotional and cognitive disabilities may have difficulties reading, speaking, grasping visuals, texts or numbers, faulty memory, poor cognitive mapping and extreme discomfort and disorientation in certain situations (Boys, 2012; I Am Sam, 2001; Mycroft, 2013). They are the most difficult group to take into consideration during the design process, because they appear to be normal unless forced to use their cognitive skills in situations (Lifechez, 1987). These people shun public places and tend to venture out with their guardians for fear of being disoriented and lost. Nevertheless, they expressed preferences for clear communication, well-positioned and defined signages (SABS, 2011, Mycroft, 2013).

Hard-of-hearing and deaf people like me favour strong visual cues and visual expression as expressed by the cognitive disabilities group. We are more sensitive to subtle body language, lights, vibrations and movements to aid with non-verbal communication (Bourne, 2013; Lifechez, 1987; Switched at Birth, 2011). Surprisingly, acoustics are very important for us because we struggle in a building with poor acoustics, echoes, noises and reverberations, which interferes with assistive hearing devices and thus making communication difficult (Bourne, 2013).

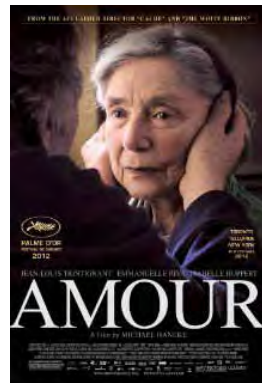
Granted that people with disabilities are no experts in the field of disabilities and Universal Design; their views and insights are invaluable for us built environment professionals. They have highlighted the important role of sensory experiences in architecture.

3.4. Inspiring people who participated in my research.

DISABILITIES IN MEDIA

Films and media are an effective medium in illustrating the perspectives of people with disabilities, the problematic situations, social dynamics and solutions they identified with. It is for this reason that I have been recommended a variety of film and videos by people with disabilities during my extensive interviews and research process. These recommendations provide more insights on disability issues and challenges that are difficult to capture in interview transcripts and in turn became my precedents for design ideas.

Below are selected videos that are relevant in challenging attitudes and illustrating design solutions.



Amour. 2012. [Film]
Directed by Michael Haneke. France: Les Films du Losange.
Ageing

The French movie centered around the life of an ageing couple who struggled cope with the consequences of the stroke that reduced the wife to paralysis. The couple tried to address this through interventions, such as motorised wheelchair, refitting the bathroom, using a home-care bed, therapies and hiring nurses.



Blind Dating. 2006. [Film]
Directed by James Keach. USA: Samuel Goldwyn Films.
Blindness

Blind Dating is mostly about a visually-impaired protagonist's search for a companion. There are scenes that showed few examples of how a blind person would memorise spatial setting and fixed features to aid with orientation and way-finding.



Children of a Lesser God. 1986. [Film]
Directed by Randa Haines. USA: Paramount Pictures.
Deafness

With real deaf actors, the movie revealed useful assistive technologies and architectural feature that deaf people use for communication. For example, the flashing light replaced the school bell, mirrors are strategically placed for visual awareness and suspended wooden floorings allow a person to stamp and attract attention as an equivalent for verbal calling.



Hear Me. 2009. [Film]
Directed by Cheng Fen-fen. Taiwan: Trigram Films.
Deafness

The Taiwanese film highlighted the inadequacy of fire alarm system for deaf and hard-of-hearing people a high density residence in one scene. Beside that, other communication technologies of contemporary time such as cellphone, video calling and fax are used to replace verbal communication which demonstrate the best practice of Universal Design in communication.



I Am Sam. 2001. [Film]
Directed by Jessie Nelson. USA: The Bedford Falls Company.
Cognitive and developmental disabilities

The touching drama provides some perspective on society's discrimination and attitudes towards people with disabilities. It teaches that people with disabilities need supports and acceptance for integration into mainstream society.



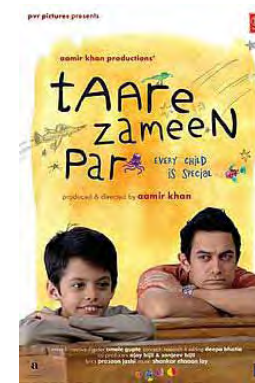
Murderball. 2005. [Documentary Film]
Directed by Henry Alex Rubin & Dana Adam Shapiro. USA: ThinkFilm.
Physical Disabilities

Murderball is a documentary of "wheelchair rugby" played by the USA and Canadian Paralympic teams. It explored the lives of people with physical disabilities and their rehabilitation progress. It showed each individual's way of doing mundane tasks and living a life of normalcy with their functional limitations.



Music Within. 2007. [Film]
Directed by Steven Sawalich. USA: The Weinstein Company, Liongate.
Multiple Disabilities

True story of a hearing-impaired activist who played a role in creating the influential American with Disabilities Act and opening up employments for people with disabilities. The movie scenes showed situations and spatial conditions that inspired the activist to challenge discriminations and fight for the rights of people with disabilities.



Taare Zameen Par. 2007. [Film]
Directed by Aamir Khan. India: Aamir Khan Productions.
Cognitive Disability

The Indian film exploring socio-cultural attitudes toward learning difficulties in children. It tells a story of a dyslexic pupil who struggle in school amidst the high expectations. The film teaches that one can overcome challenges with the right attitude and with the right people.



The Miracle Worker. 1962. [Film]
Directed by Arthur Penn. USA: Playfilm Production.
Multiple Disabilities

This is a true story of Hellen Keller who was born blind and deaf. It tells how she was able to understand and communicate concepts without sounds and sights through the help of her therapist. The film setting showed that a person's environment needs to be consistent to allow for familiarity and orientation.



The Other Sister. 1999. [Film]
Directed by Garry Marshall. USA: Touchstone Pictures.
Cognitive Disability

The movie centered around a woman with developmental disability seeking independence from her family and caregivers. The film captured people with disabilities' desire for independence, acceptance and integration into mainstream society.



The Sea Inside. 2004. [Film]
Directed by Alejandro Amenábar. Spain: Fine Line Features.
Quadriplegic

A true story of Spaniard Ramón Sampedro who was left quadriplegic after a diving accident and campaigned for euthanasia and the right to die with dignity. It provide insight into the sensory and spatial experiences a quadriplegic person including assistive furniture.



Wait Until Dark. 1967. [Film]
Directed by Terence Young. USA: Warner Bros.
Blindness

The movie was set in a home of a blind housewife. The activities around the domestic space revealed that the environment needs to be consistent for a visually-impaired person to allow for familiarity and orientation. The housewife's spatial perception is further aided by her memory of furniture locations and heightened sense of hearing.

YouTube clips and television series: These videos documented real life stories of people with disabilities, their challenges and spatial needs.

1. Equivicae, 2007. *Extraordinary People - The boy who could see without eyes.* **Blindness.**
2. Equivicae, 2013. *Extraordinary People - The woman with half a body.* **Multiple Disabilities.**
3. *I Am A Women Leap of Faith: Andrea Lewis.* 2013. [YouTube clip] Directed by Lauren Groenewald. **Cochlear Implant.**
4. *My Deaf Family.* 2010. [YouTube Clip] Directed by Marlee Matlin. USA: Solo One Productions. **Deafness.**
5. Discovery Health, 2009. *Parents Lovingly Raise the World's Only Deaf-Blind Triplets.* **Multiple Disabilities.**
6. *Switched at Birth.* 2011. [TV Series] Directed by Lizzy Weiss. USA: ABC Studios. **Deafness.**
7. *The Deaf Family.* 2008. [YouTube clip] Directed by Chad W. Taylor. USA: Mosdeux. **Deafness.**

Switched at Birth and *The Deaf Family* television series are excellent at capturing the lives of deaf people and deaf families and how they respond to awkward situations. There are scenes that show the clever use of mirrors, flickering lights for the door bells and open spaces that enable a deaf person to be aware of the activities around. Other scenes showed new technologies that deaf people used for communication, such as video calling, text messages and relay services.

SENSORY EXPERIENCES

Sensory experiences involve the constant interactions between a human body and the physical environment through the five senses of sight, hearing, smell, taste and touch (Diaconu et al., 2011). The interactions with the environment provide a range of multi-sensory experiences that we can associate with different places and moods (Diaconu, et al., 2011; Bloomer & Moore, 1977). As an example, Hout Bay is associated with the smell of fish, the taste of seafood, the sounds of marine birds, the sights of fishing boats and the tactile surfaces of the harbour piers. Usually the identity of a place is deeply ingrained with the scent and taste of food it produces as in the case of Hout Bay (Diaconu, et al., 2011).

The sense of smell is the most powerful intangible quality for blind and visually-impaired people to aid with cognitive mapping and orientation (Diaconu, et al., 2011; Lifechez, 1987). A blind person can identify different places by their typical scents such as cafés by the smell of coffee beans, florist shops with flowers and cosmetic stores with chemical fumes (Daniels, 2013; Diaconu et al., 2011). These kinds of odours can bring life into a space and conjure up colourful imagery and feelings. Blind people are not more sensitive than normal people, but are better at discriminating and identifying odours to compensate for their lack of sight (Diaconu et al., 2011; Lifechez, 1987; Opperman, 2013).

Yet, contemporary architecture had been reduced to mere visual expression and commodity in today's technological world focusing on aesthetic and appearance without any references to sensory experiences (Boys, 2012; Clarkson, et al., 2003; Pallasmaa, 1996). In addition, the perception and

knowledge of architecture continues to be dominated by ocular-centrism, with sight being regarded as the most important sense which is grounded in psychological, physiological and perceptual facts (Pallasmaa, 1996).

An environment based on mere visual expression and lacking in compensatory cues or coherent nonvisual cues can create feelings of insecurity, frustration, emotional and physical disorientation for people with disabilities (Lifechez, 1987). Pallasmaa explained that the eyes alone cannot measure the depth, volume, shape, weight, craft or details of a space independently of the other senses (Pallasmaa, 1996). To experience and understand a space, you have to confront it with your body in its full material and spiritual presence and with the five senses as well (Pallasmaa, 1996).

In "The Eyes of the Skin", Julhani Pallasmaa provided strong theoretical support for sensory experiences in architecture (Pallasmaa, 1996). He had stated that hearing creates a sense of connection and solidarity, and sight is the sense of the solitary observer (Pallasmaa, 1996). However, he did not consider how people with sensory disabilities will perceive spatial conditions differently from the abled bodies people. One can wonder how a person with hearing loss and or limited vision can observe, connect and communicate in a space.

Architects and designers can learn from the challenges of people with sensory disabilities that the importance of sensory experiences have been underestimated. In addition, intangible qualities of space such as sounds, scents, air humidity and temperature need to be taken in consideration during the design process (Boys, 2012; Lifechez, 1987).

EYES ARE WARY
OF AN OUTCAST
GUARDING MY CAR
ASSAULTED BY FLYING RODENTS,
AS I STUMBLED ON GRAVELS
GUIDED BY THE AROMA
OF FRESH OVEN BAKED CAKES
HUNGERED FOR THE KICK OF TRIPLE THICK
CHOCOLATE BROWNIE,
TO CONSIGN MY BEING
INTO A LULL.

FIRST IMPRESSION OF THE SITE



ARCHITECTURE MEETS OCCUPATIONAL THERAPY

Recent work has shown that the distinctions between a disabled body and a “normal” human body are blurred through advances in biomedical engineering and assistive technologies. This has helped people with disabilities such as me to overcome our functional limitations and societal attitudes (Pullin, 2009; Wanenchak, 2012; McDonald, 2010; Diaconu, et al., 2011). The assistive technologies and universally designed products such as hearing aid, Domino pro system and carbon-fiber blades fall within the realms of biomedical engineering, occupational therapy and industrial design (Olguntürk & Demirkan, 2009). These technologies were developed through collaboration of engineers, occupational therapists, clinicians, nurses and other caregivers (Pullin, 2009).

The design of assistive technologies relies on the medical model of ergonomics in order to meet individual needs (McDonald, 2013). As an example, ear-molds of hearing aids do not come in standard sizes as people have different ear canal impressions. The same applies to the design of wheelchair seats and prosthetic limbs to meet the user ergonomic requirements (McDonald, 2013, Pullin, 2009). Designers can learn from the medical field of occupational therapy when designing rehabilitation products and environments to meet ergonomic needs and aid with changing mindsets toward people with disabilities (Conway, 2008; Pullin, 2009).

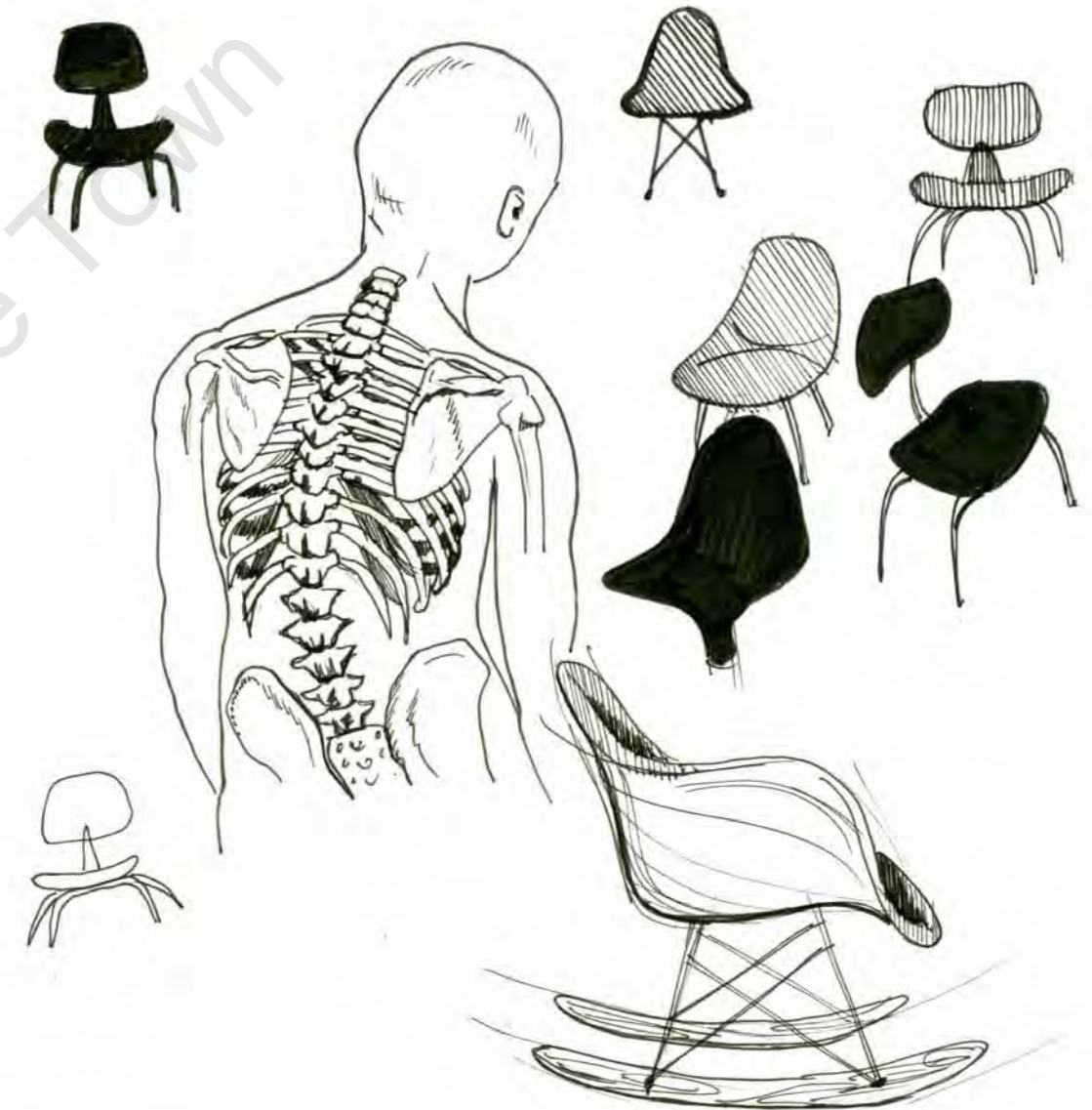
Briefly, occupational therapy is a very broad field focusing on treatments of human health in relation to human activities, functions and the environments (Conway, 2008, Jacobs, 2008). Occupational therapists work with a wide range of people on many health-related issues such as post-operation rehabilitation, amputations, speech therapy and mental exercises to name a few. The scope of the field relies on cross-fertilisation of skills and knowledge in order to keep up with the changes in political, social and cultural perspectives of health and disabilities (Conway, 2008; Karwowski, 2005).

The collaborations and cross-fertilisation of ideas between architecture and the medical fields has benefits even though the two fields are distinctly different. The medical model of ergonomic is one of aspect architects and designer can learn from as it mainly concerned with human health in forms of anatomical, anthropometrical, physiological and biomechanical characteristics as they relate to physical activity (Karwowski, 2005; Pullin, 2009). It can help designers to understand the impact of design decisions on the health of a human body beyond the criteria of maximum fit, comfort and effective use (Clarkson et al., 2003; Conway, 2008; Karwowski, 2005).

Research in occupational therapy's approach to ergonomics revealed five fundamental assumptions to avoid in the design process (Conway, 2008; Jacobs, 2008):

1. The design is satisfactory for me and therefore will be satisfactory for everyone.
2. The design is satisfactory for an average person and therefore will be satisfactory for everyone.
3. The variability of human beings is so great that it cannot possibly be catered for in any design, but since people are wonderfully adaptable, it does not matter anyway.
4. Ergonomics is expensive and since products are actually purchased on appearance and styling, ergonomic considerations may conveniently be ignored.
5. Ergonomics is an excellent idea, I always design things with ergonomics in mind. But, I do it intuitively and rely on common sense so I do not need tables of data or empirical studies.

Such design decisions that take the inputs of occupational therapists into consideration can help ensure a comfortable environment for specific end-users without expensive modifications, adaptations or add-ons at the expense of the client (Boys, 2012; Imrie & Hall, 2001).



3.6.

TURNING THE TABLES

HOW DESIGN CAN CHANGE ATTITUDES TOWARD PEOPLE WITH DISABILITIES?

Design solutions are used to help people with disabilities overcome their functional limitations through assistive technologies, biomedical engineering and the application of Universal Design principles to product design. Yet, there is a need for Universal Design and design in general to become an effective teaching and rehabilitation tool to change attitudes toward disability issues.

Usually the design solutions are developed from the collaboration of professionals with little inputs from people with disabilities. What if people with disabilities take the role of designers and architects? Would they create situations that turn the tables on the abled bodied users and expose them to disability issues?

Below is my initial concept for a building in which I proposed spatial conditions that reflect the different worlds of people with disabilities and their perceptions of the environment.

These spatial conditions can become places for rehabilitation and therapy. My intention is to explore design ideas that challenge and place restrictions on the bodies of all building users. Bodily restrictions can be done voluntarily by blindfolding, wearing earplugs,

confining one's body to a wheelchair or crutches. Under these conditions the users will be exposed to disability issues and learn extra-sensory skills to compensate for the imposed restrictions. This way the building users will develop a paradigm shift and an understanding toward disability issues.

The concept is a series of "what if" notions that can challenge conventional thinking in the design process.

- "What if a person with cognitive disability or uncontrolled obsessive compulsive disorder designs a building?"
- "What if all the seating furniture are fitted with wheels and all furniture are designed to accommodate the ergonomic of a wheelchair?"
- "What if sign language is the only accepted form of communication within the building?"
- "What if the building has good acoustic properties that make people highly sensitive to sounds?"
- "What if all building users are forced navigate the space with limited vision?"

The following sections illustrate design ideas that form part of the programming requirements and the final design of the multi-sensory building.

IMAGINE IF "NORMAL" PEOPLE ARE THE MINORITY:



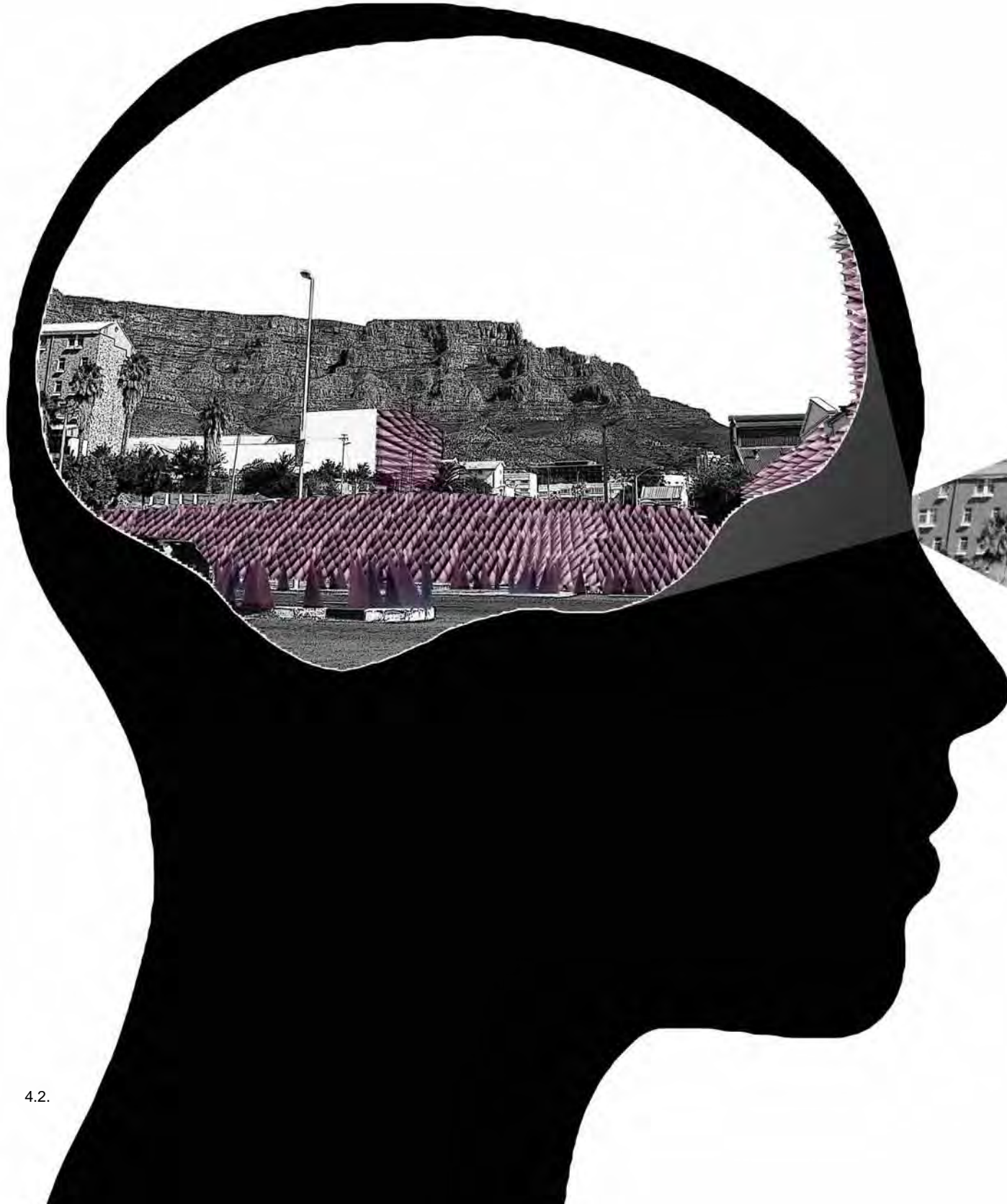
4.1. Initial concept for Extra-Sensory Expo.

VISUAL AGNOSIA

Visual Agnosia is an impairment in the brain that results in the inability to recognize or interpret objects in the visual field (Hoag, 2013). Visual agnosia can be seen in people with cognitive disabilities who have difficulties grasping numbers, texts, appearance or graphic. This condition results in people having emotional disconnection with their surrounding and with other people. Visual agnosia is the first concept I applied to my chosen site in an attempt to challenge the visual perception of the site and to reflect the emotional disconnection of people with disabilities.

The purple pyramids are acoustic wedges taken from an anechoic chamber (a sound-proofed room used for measuring sound quality of objects). The chosen site in the Fringe Precinct is covered with iconic pyramidal foam cushions to resemble oversized acoustic wedges. This creates a strange landscape that is emotionally disconnected from the urban context. The landscape can be perceived as angry and repulsive. The intention of the visual impact is to capture the emotional disconnection that people with disabilities feel in mainstream society. The visual appearance can function as a landmark to aid with orientation and to attract public curiosity.

Furthermore, the “wedges” can function as sound barriers to filter out the noise of the city especially the noise from the busy traffic. They can also help with way-finding through difference in texture, function and materiality.

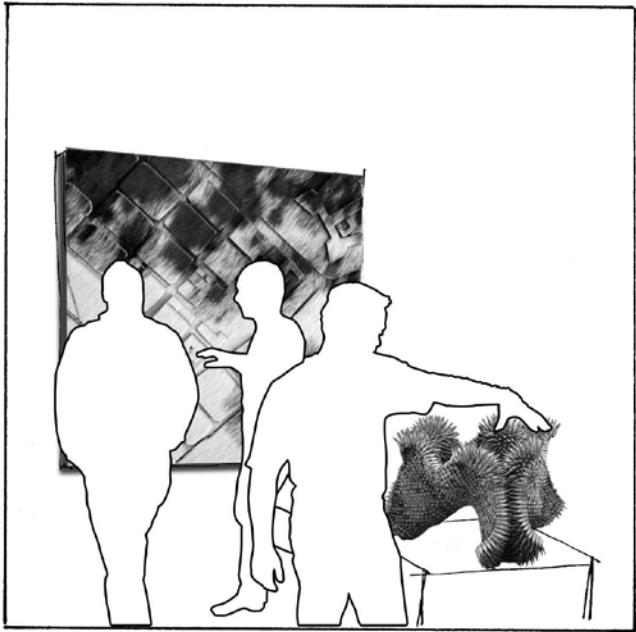


TACTILE GALLERY

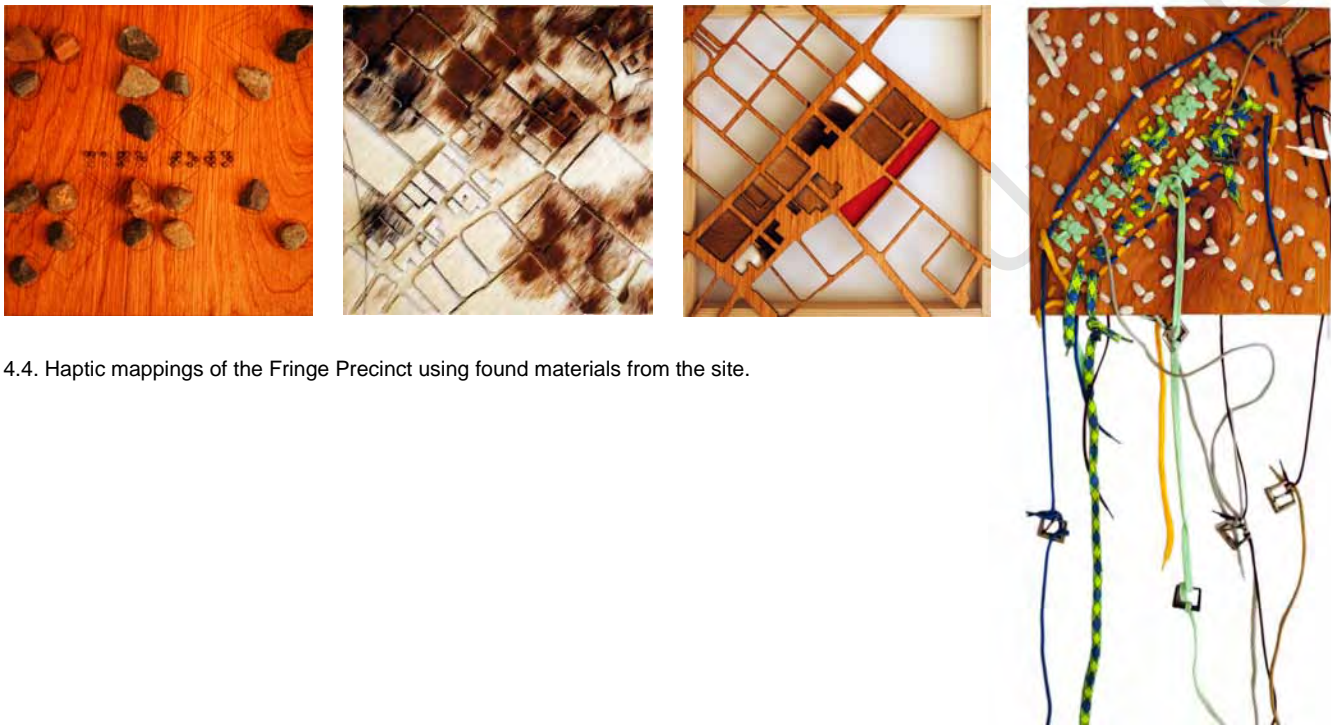
Blind and visually impaired people cannot appreciate the visual field that we are accustomed to and cannot understand concepts that we can see. In spite of their limited vision, they can perceive their surrounding with other senses and rely on the sense of touch to understand concepts.

Visual fields like art, design and architecture are usually appreciated by sight and there is an unwritten rule that they should not be touched. This inspired an idea of a gallery space containing haptic artworks (fig 4.4) and encouraging visitors to appreciate the visual fields through touch.

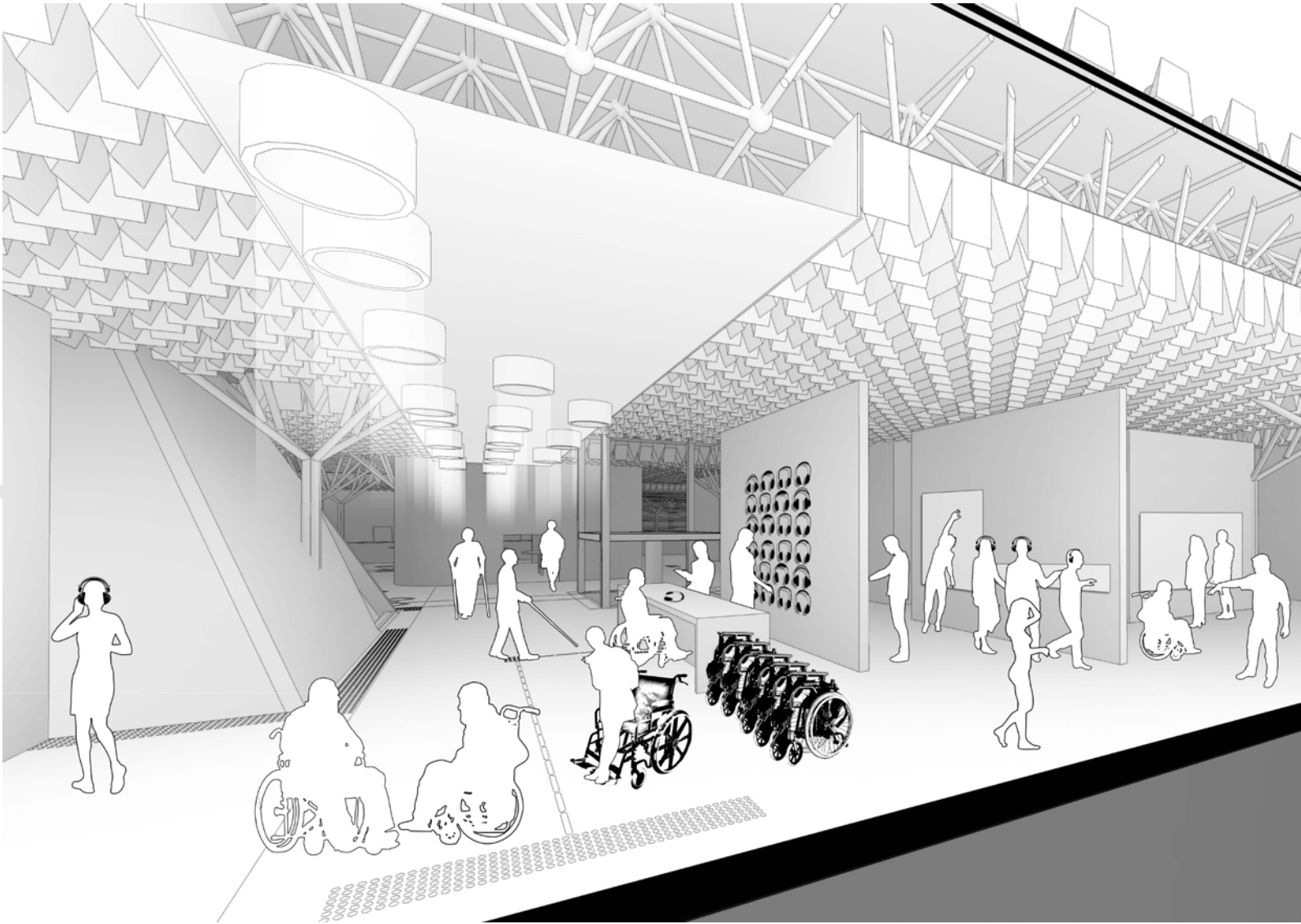
The gallery space can be a setting for teaching blindfolded visitors way-finding strategies and technologies used by visually-impaired people, such as a white cane, audio-guide and audio-description. This initiative can challenge all users' psychological dependence on sight as the primary sense.



4.3. Tactile artworks.



4.4. Haptic mappings of the Fringe Precinct using found materials from the site.



4.5. Rendering of the Tactile Gallery and information desk.

DINING IN THE DARK

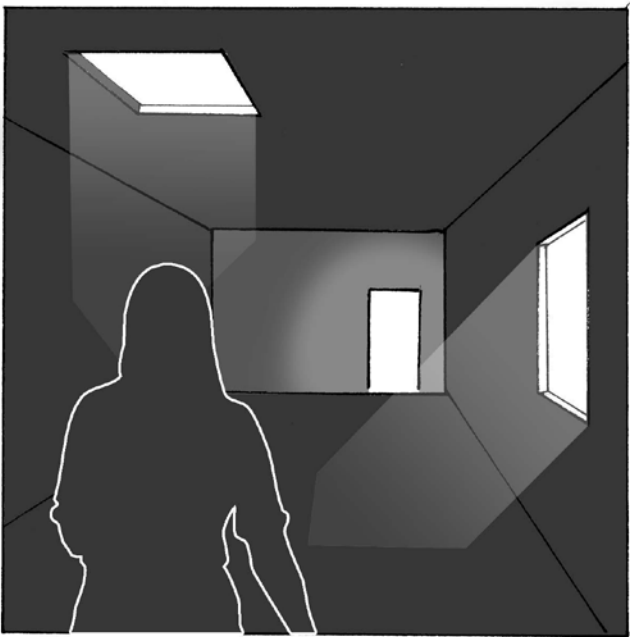
Beyond way-finding strategies and using assistive technologies, people with disabilities have their own challenges in performing mundane tasks in public such as shopping, cooking, dining and participating in table conversations. Restaurants are popular public spaces and many people with disabilities find the spatial design of restaurants uncomfortable (See Appendix I).

Therefore, the South African Guide-Dog Association for the Blind and the Cape Society of the Blind have an educational initiative called "Dining in the Dark". This initiative challenges sighted people to dine in restaurants with blindfolds and exposing them to daily challenges of visually-impaired people (Daniels, 2013; van Wyk, 2013). The "Dining in the Dark" initiative inspired a dining hall and open-plan kitchen that encourage visitors to perform mundane tasks in a public setting with their chosen bodily restrictions.

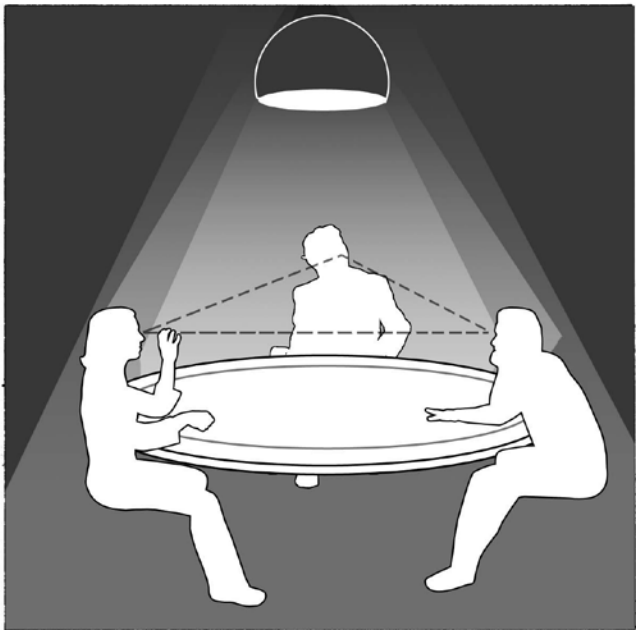
The dining hall is dimly lit with strategically placed lights to provide visual contrast. The space can be accessed by using a wheelchair due to the low height of the doorway. This will force the diners to be seated in wheelchairs instead of conventional chairs in order to promote equity. Within the space are round tables to aid with unobstructed visual connection among diners.

The tables are fitted with IDEO's Table Talk technology that allows people to connect their assistive hearing devices to a microphone installed on the table (Pullin, 2009). This assistive technology will help cut off background noises and include people with hearing loss in meal conversations.

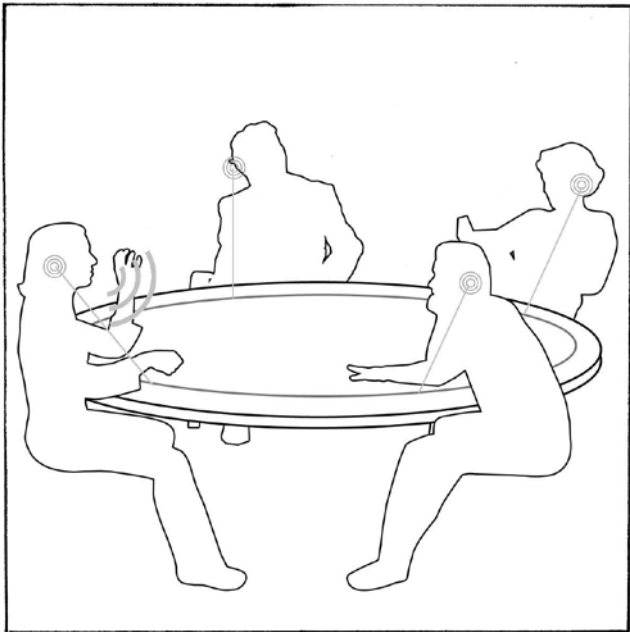
The dining hall may provide an ideal setting for team-building exercises or other initiatives used by blind societies and therapists working with people with disabilities.



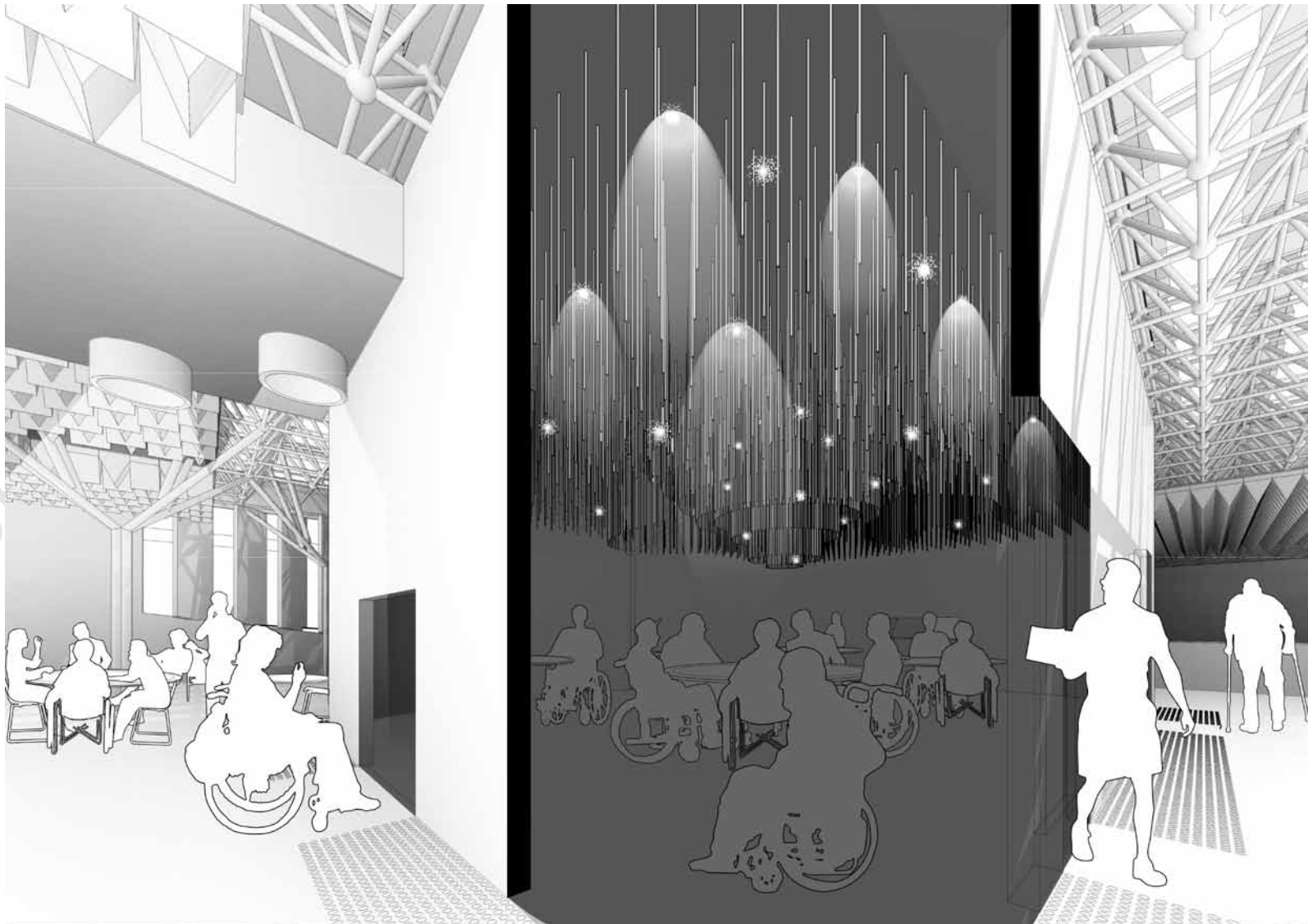
4.6. Strong contrast and lighting effects.



4.7. Clear visual connection for communication.



4.8. IDEO's Table Talk technology.



4.9. Rendering of the Darkroom.

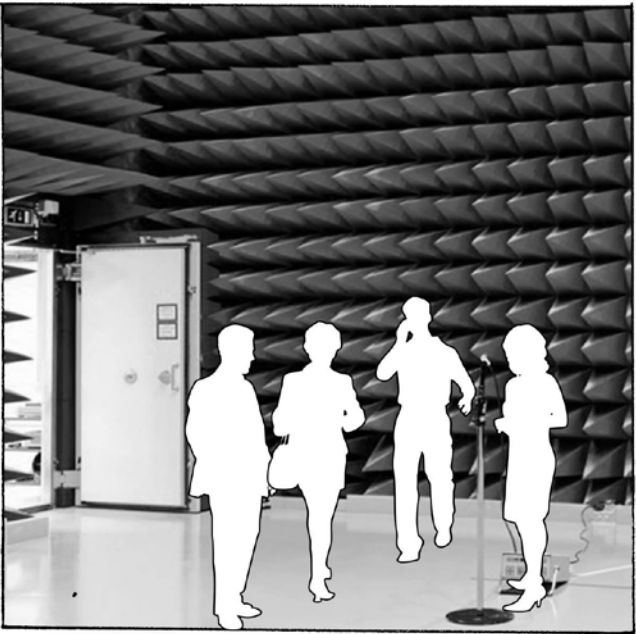
THE ANECHOIC CHAMBER

The previous design ideas and strategies dealt with the senses of sight, touch, smell and taste. The sense of hearing is usually associated with event venues, performance spaces and nightclubs where sounds are produced and appreciated.

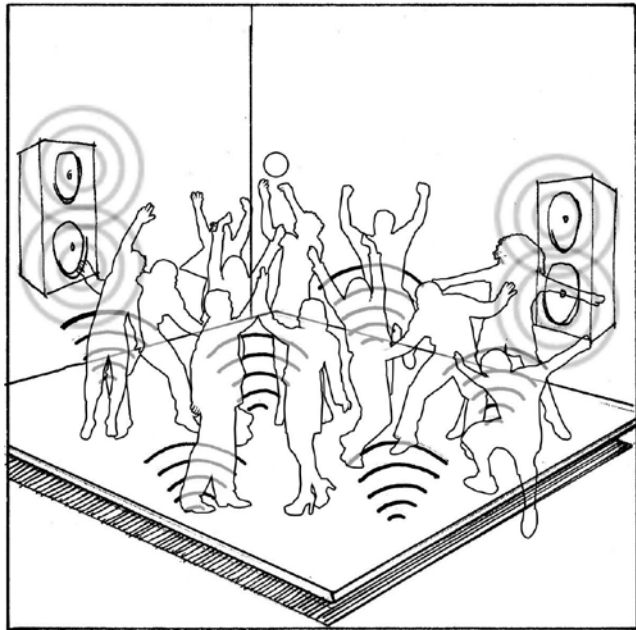
People with hearing loss are often excluded in these spaces due to reverberations which interfere with assistive hearing devices and create difficulties in communication. Deaf people on the other hand do not hear the music but feel the vibrations and their appreciation of music is different from hearing people. These situations motivated the need for an event venue designed with proper sound insulations and good room acoustics. This will help reduce reverberations and prevent unwanted noises from entering or escaping the space.

The multipurpose event venue is designed to resemble an anechoic chamber with pyramidal acoustic wedges as sound absorbers. Certain parts of the event venue are fitted with sound diffusers and reflectors to enhance the quality of music and aid with clarity of speech.

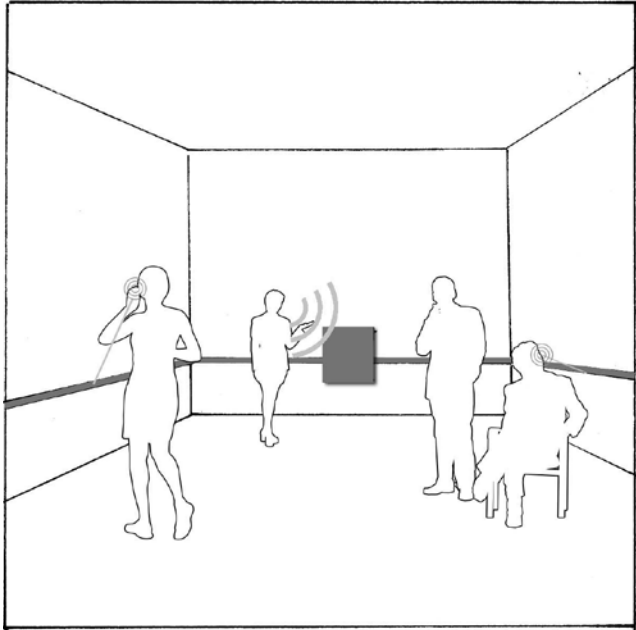
Assistive hearing technology such as the Loop system can be integrated into the spatial design to benefit people wearing hearing devices. An innovative dance floor, called Sensefloor, which converts sounds and music into vibrations by the use of vibrating mechanisms will be part of the spatial programme.



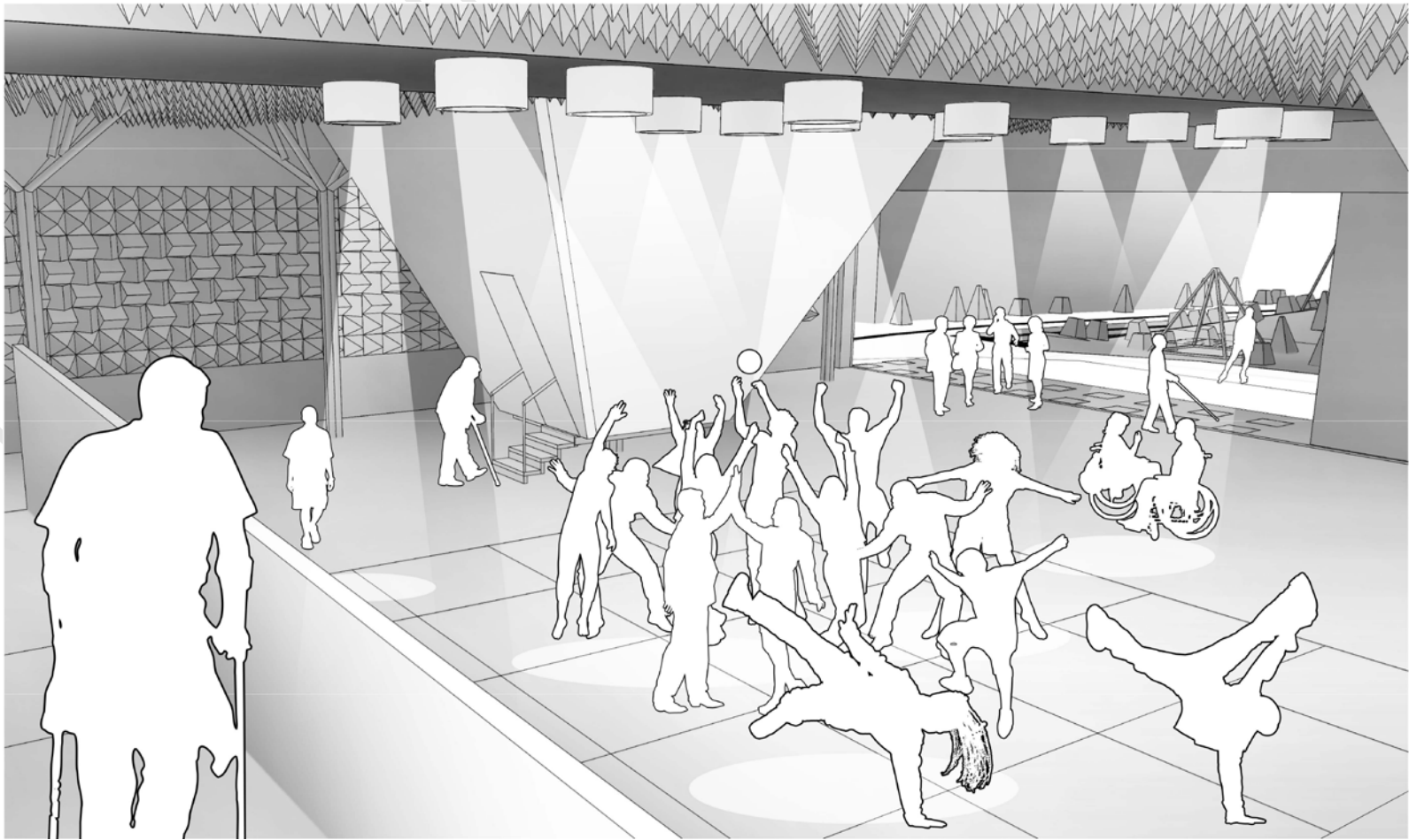
4.10. Anechoic Chamber



4.11. Sensefloor, the vibrating dancefloor.



4.12. Loop system.



4.13. Rendering of the Anechoic Chamber.

AUXILIARY SPACES

There are auxiliary spaces surrounding the dance floor that contain the different worlds of people with disabilities. These spaces provide escapes from the crowds for contemplation and therapy.

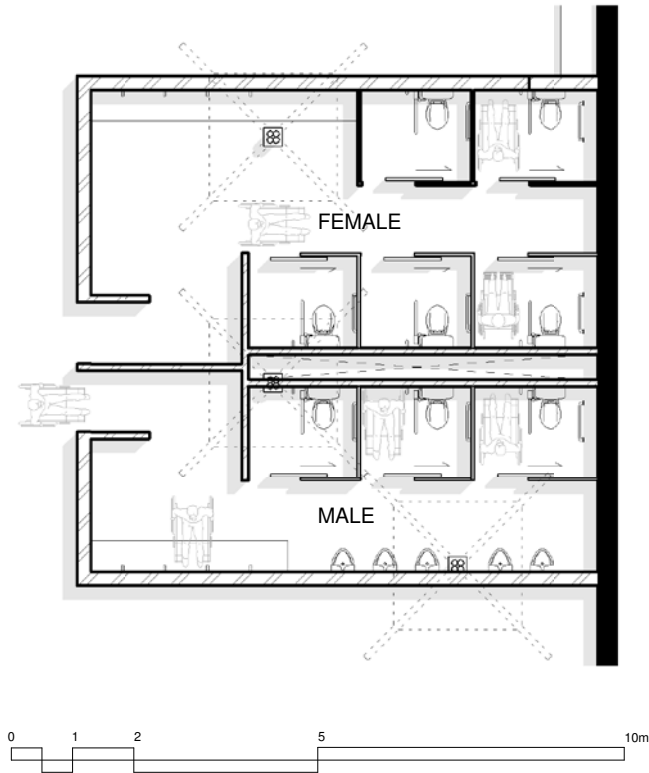
The Asylum - the asylum is a padded cell with an observation window for a skylight. It can be used as an administration space or a meeting space for “patients”.

Audiometric testing booth - a sound-proof cell used for testing hearing ranges and communication skills. This space can be used for smaller group meetings and exposing all users to a range of low to high frequency sounds.

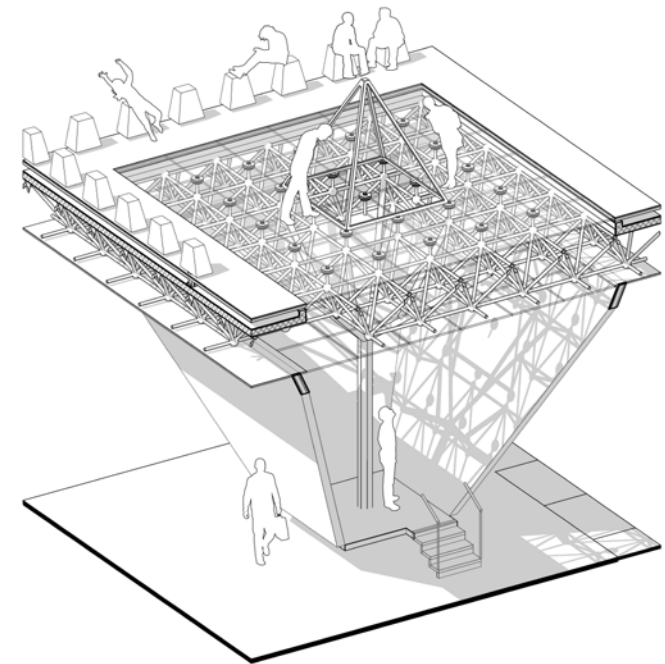
Scream room - a sound-proof cell renamed as the scream room to provide a space for expressing uncontrolled emotions away from the crowds. Both the Audiometric Testing Booth and Scream Room have an observation window for skylight to open up the internal activities for public viewing.

Wheelchair accessible toilets - the ablutions are designed to accommodate wheelchair movements with the toilet cubicles modelled on the standard layout of a paraplegic toilet. The intention is to promote human dignity through the challenge of transferring one’s body from a wheelchair to a toilet seat.

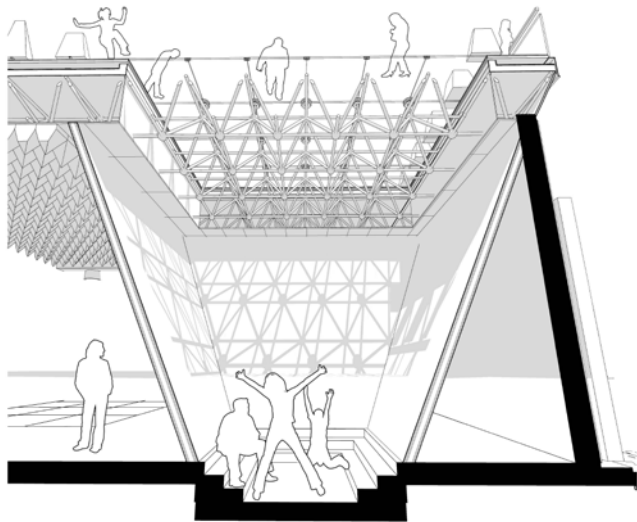
Therapy room – this space is fitted with cushioned flooring for protection against impacts and contains physical therapy tools such as exercise balls. This room can be used for physical therapy sessions.



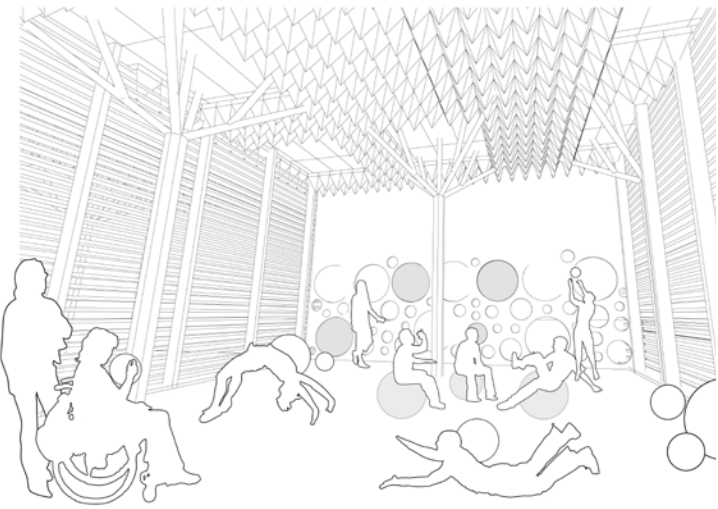
4.14. Wheelchair accessible ablutions.



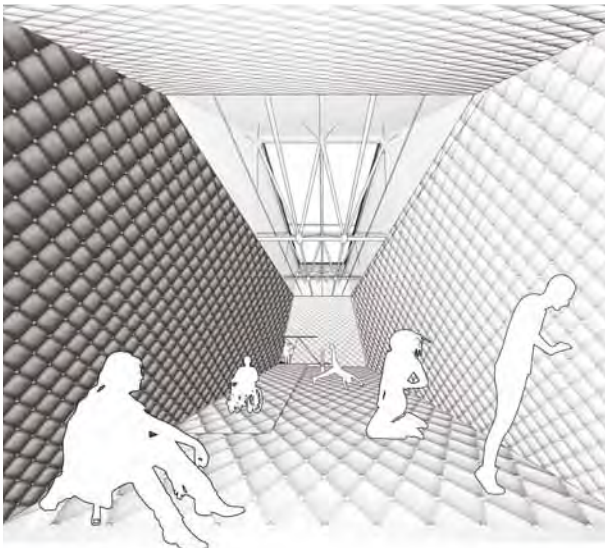
4.15. Audiometric Testing Booth.



4.16. Scream Room.



4.17. Therapy Room.



4.18. The Asylum.

SITE



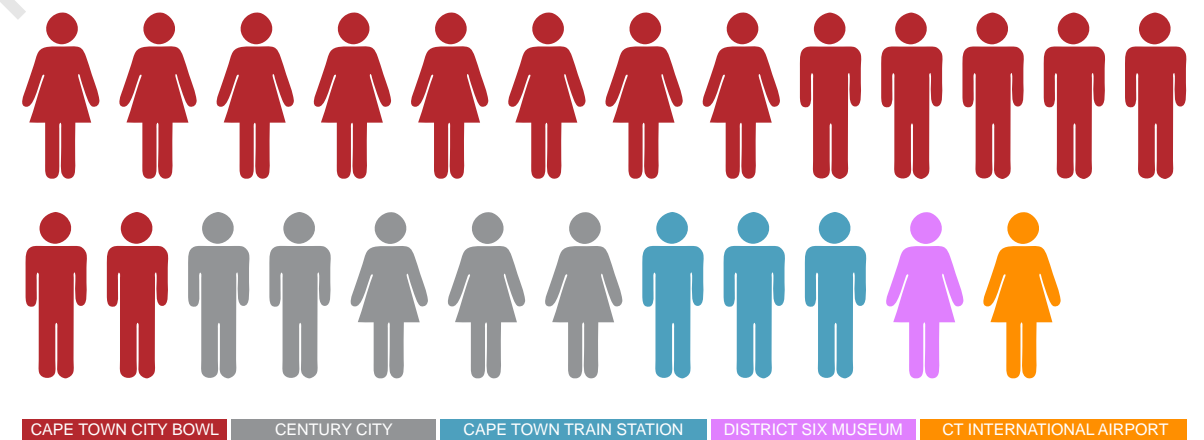
5.1.

SITE

LOCATION RATIONALE

The selection of site for the spatial programmes was guided by the social relation of the research process and extensive interviews with people with disabilities. Most of them have indicated Cape Town CBD as inaccessible for varying reasons (See Appendix I). These reasons included the lack of awareness of and information about accessible environments. As a result of this, some people with disabilities give excuses for not venturing out of their comfort zones (Mycroft, 2013; Interviewee 6, 2013). Nevertheless, people with disabilities value cultural attractions and activities in the form of galleries, museums, theatres, the Waterfront, and Two Oceans Aquarium. Rather than being on the fringe of society, they are encouraged to visit these places to stimulate their minds and bodies in order to participate in mainstream society and ease integration (Mycroft, 2013; Opperman, 2013).

QUESTION: WHICH PART OF CAPE TOWN IS INACCESSIBLE TO YOU?



5.2. Accessibility statistic based on responses of interviewees.

I used a 'sphere of influence' model to narrow down my selection of site in Cape Town's CBD. I wanted the site for the proposed multi-sensory building to be located within proximity to the creative industries, the decision makers, and the general public. The intention is to maximise the impact of Universal Design philosophy on the built environment, designers and decision makers.



5.3. Sphere of influence model: local scale

Therefore, the site is an empty parking area on the fringe of the CBD and part of a creative and media hub aptly named the Fringe Precinct. It is appropriate as it reflects the idea that people with disabilities are excluded to the fringe of society.

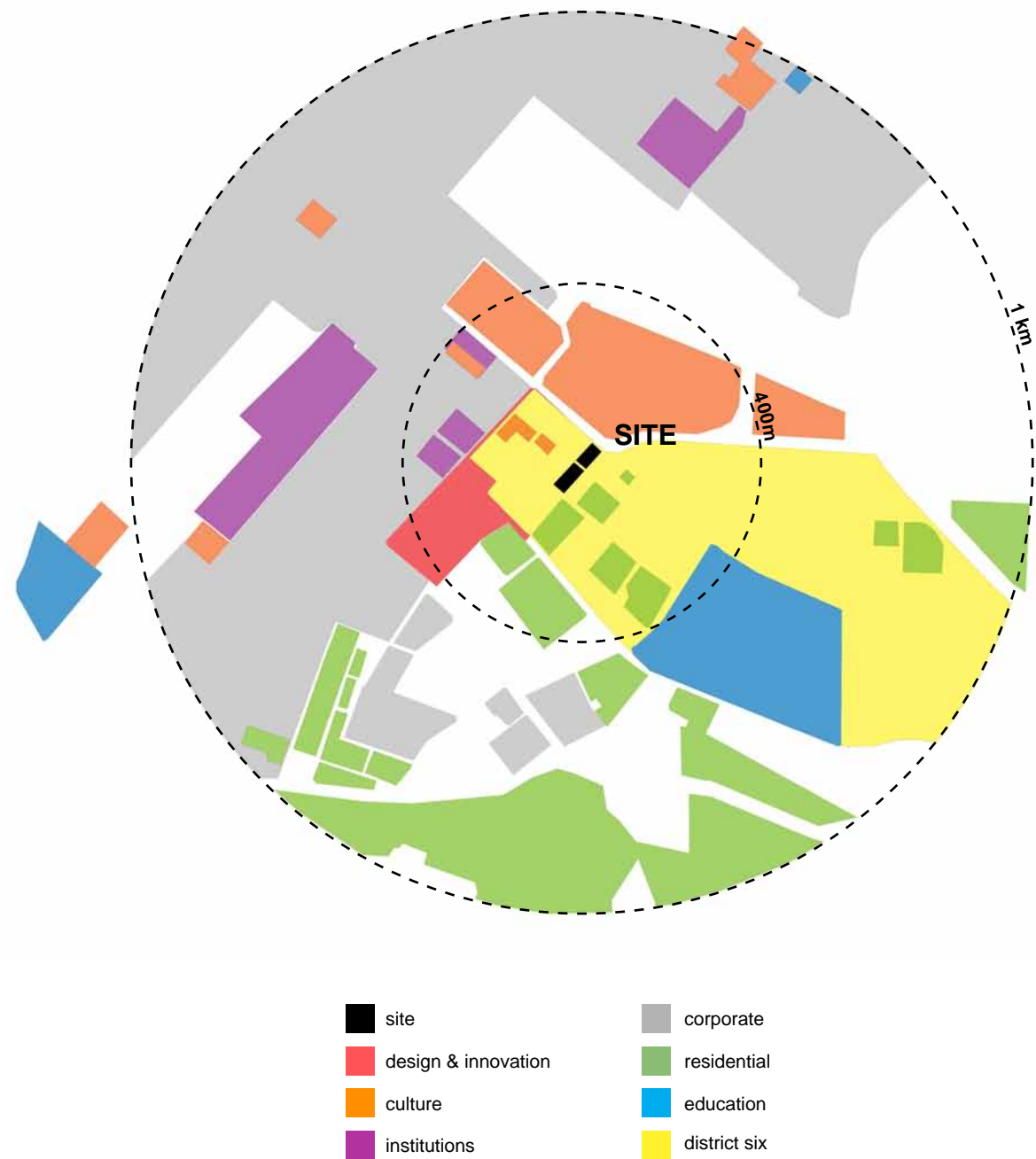
URBAN CONTEXT



5.4-5. Macro and meso maps of site location.

CONTEXTUAL MAPPINGS

The site is ideally located within 400m walking distance of designers, decision makers and the general public. Public access and awareness of the site is further enhanced by the proximity of cultural institutions and the heritage of District Six.



5.6. Contextual mappings and sphere of influence.



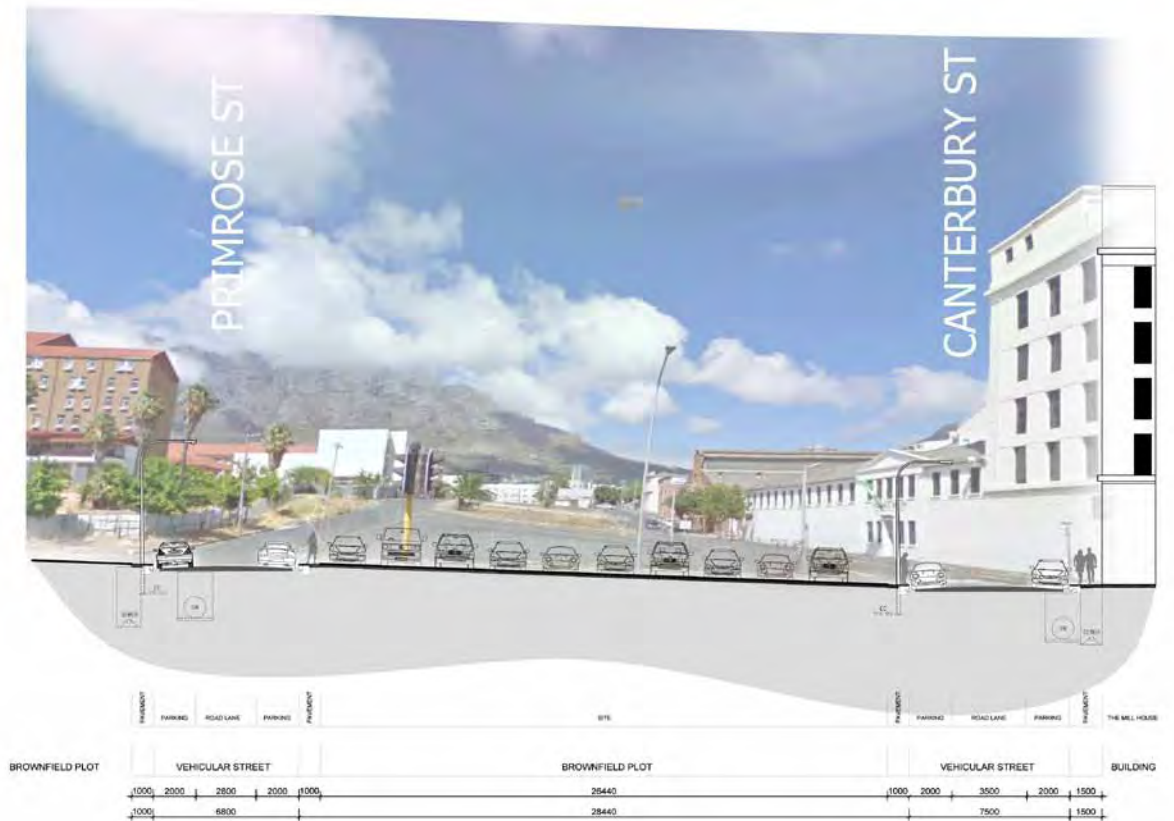
- focus area: The Fringe Precinct
- proposed new/ re development blocks
- site

5.7. Potential sites in the Fringe Precinct.

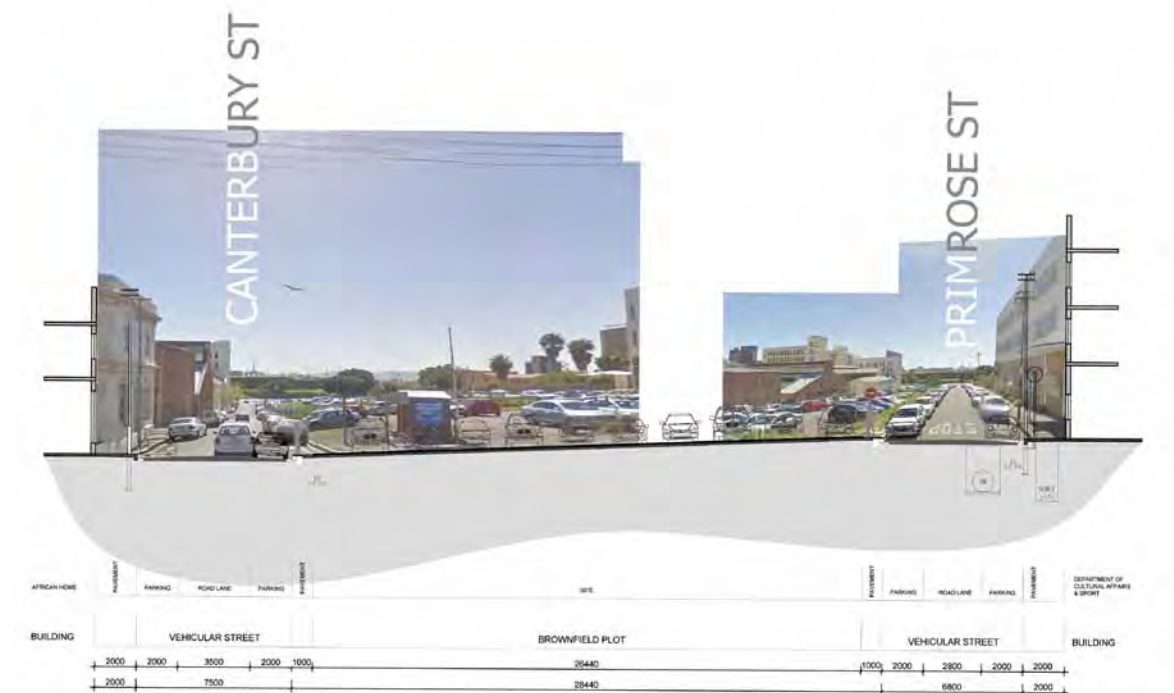
EXISTING SITE CONDITIONS

The site is approximated to be 26m wide and 125m long. In cross-section, the site slopes gently at 1:18 from sea level. The level of Darling Street is at 8m above sea level while Caledon Street is at 15m. Presently, Canterbury and Primrose streets are used for parking rather than as service streets.

The lack of buildings on the site guarantees unobstructed views of the Table Mountain and the Castle.



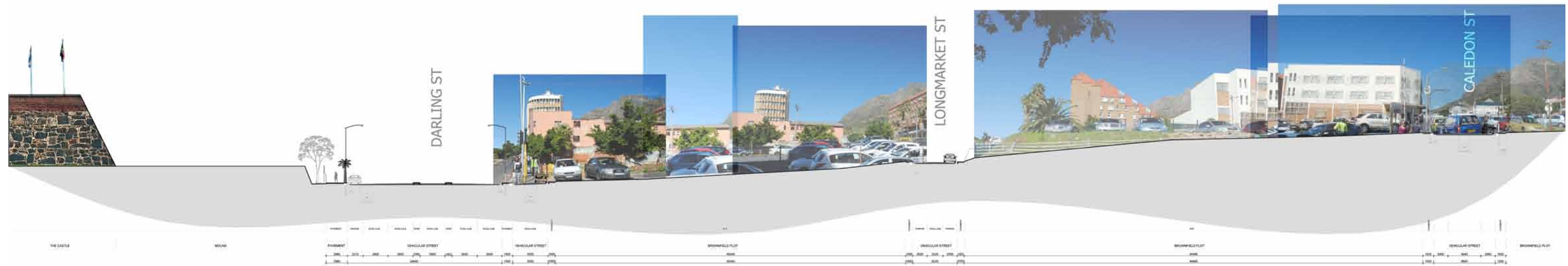
5.8. Darling Street Elevation.



5.9. Caledon Street Elevation.



5.10. Primrose Street Elevation.



5.11. Canterbury Street Elevation.

SITE HISTORY

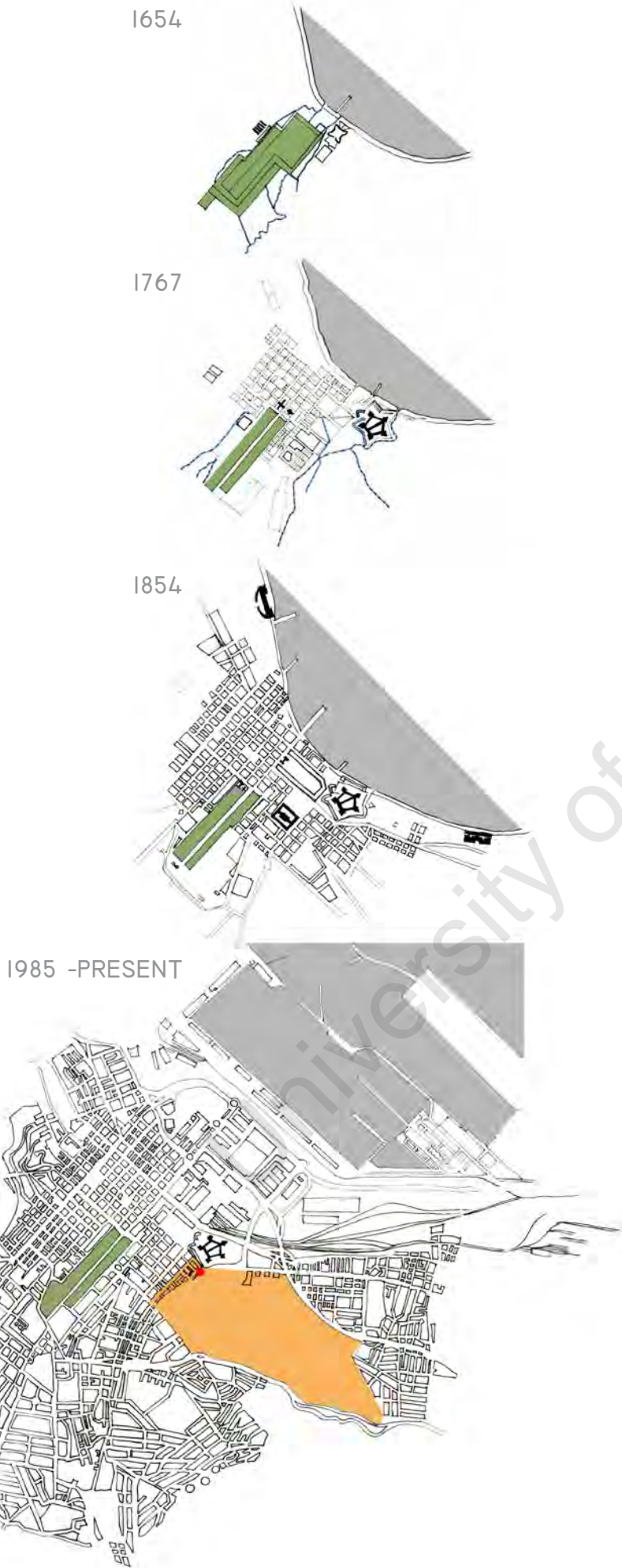
The brownfield site is situated in a historic suburb of District Six that was demolished under Apartheid's Group Area Act in the 1950s. There are no traces of buildings with historical significance within the site (Briggs, 2012). The Fringe Urban Design Framework acknowledged that the history and character of District Six had been lost and cannot be recreated (Briggs, 2012). Instead, the framework proposed that the site be part of a reclaimed landscape along Canterbury Street in an attempt to restore the hidden streams that flow under the city's streets (See Appendix III).

Historical maps of Cape Town urban morphology revealed hidden streams that once fed the Castle moats, but which were channelled and buried under the streets of Cape Town. It is assumed that Buitenkant and Canterbury streets reflect the original layout of the streams (Zeil, 2010). The exact locations of the tunnels are not in the public domain though I have decided to incorporate the Fringe draft urban design framework's proposal of restoring the river along Canterbury Street as part of the rehabilitation process (See Appendix III).

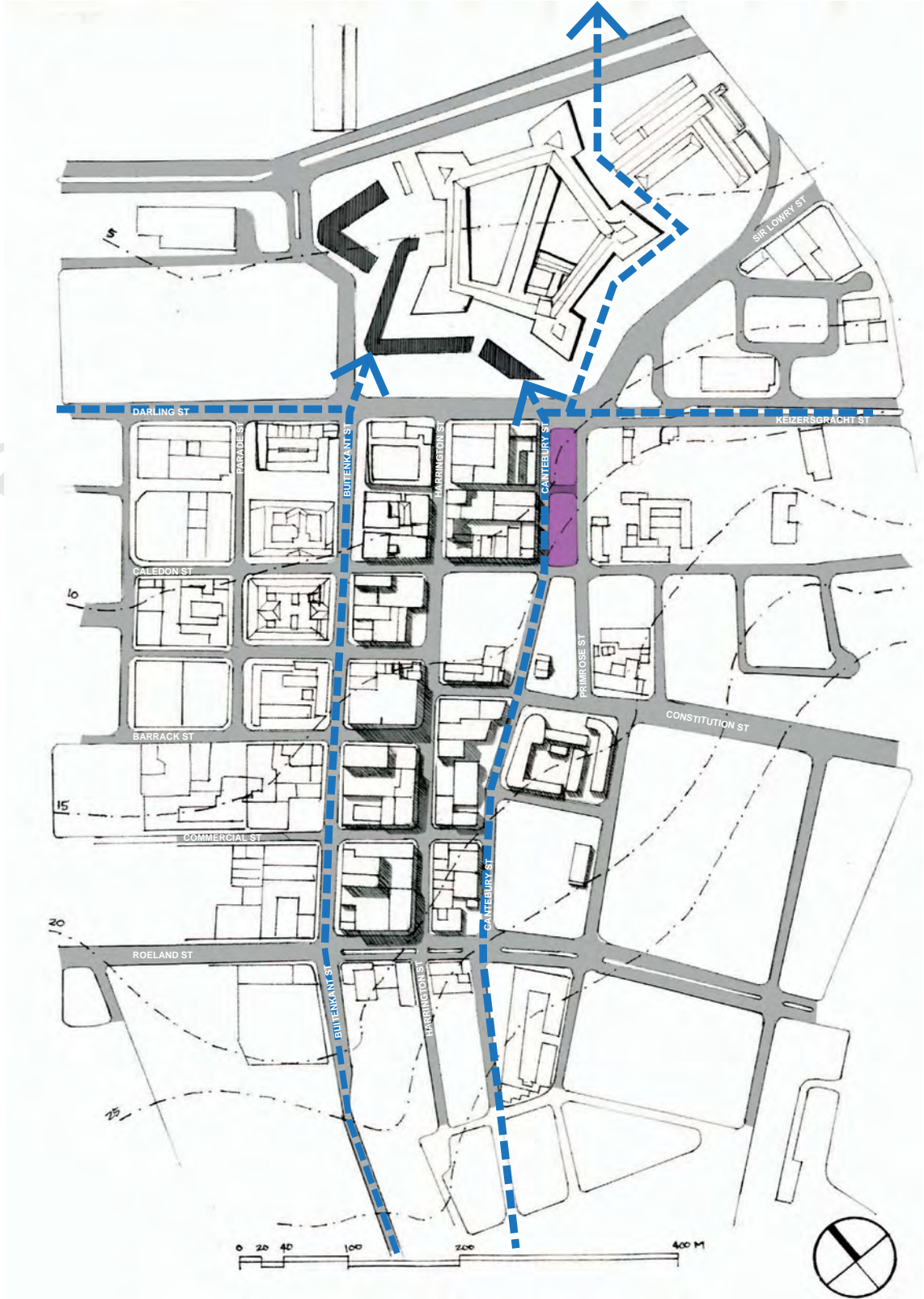


5.12. Hidden streams channelled into storm-water tunnels under Cape Town streets.

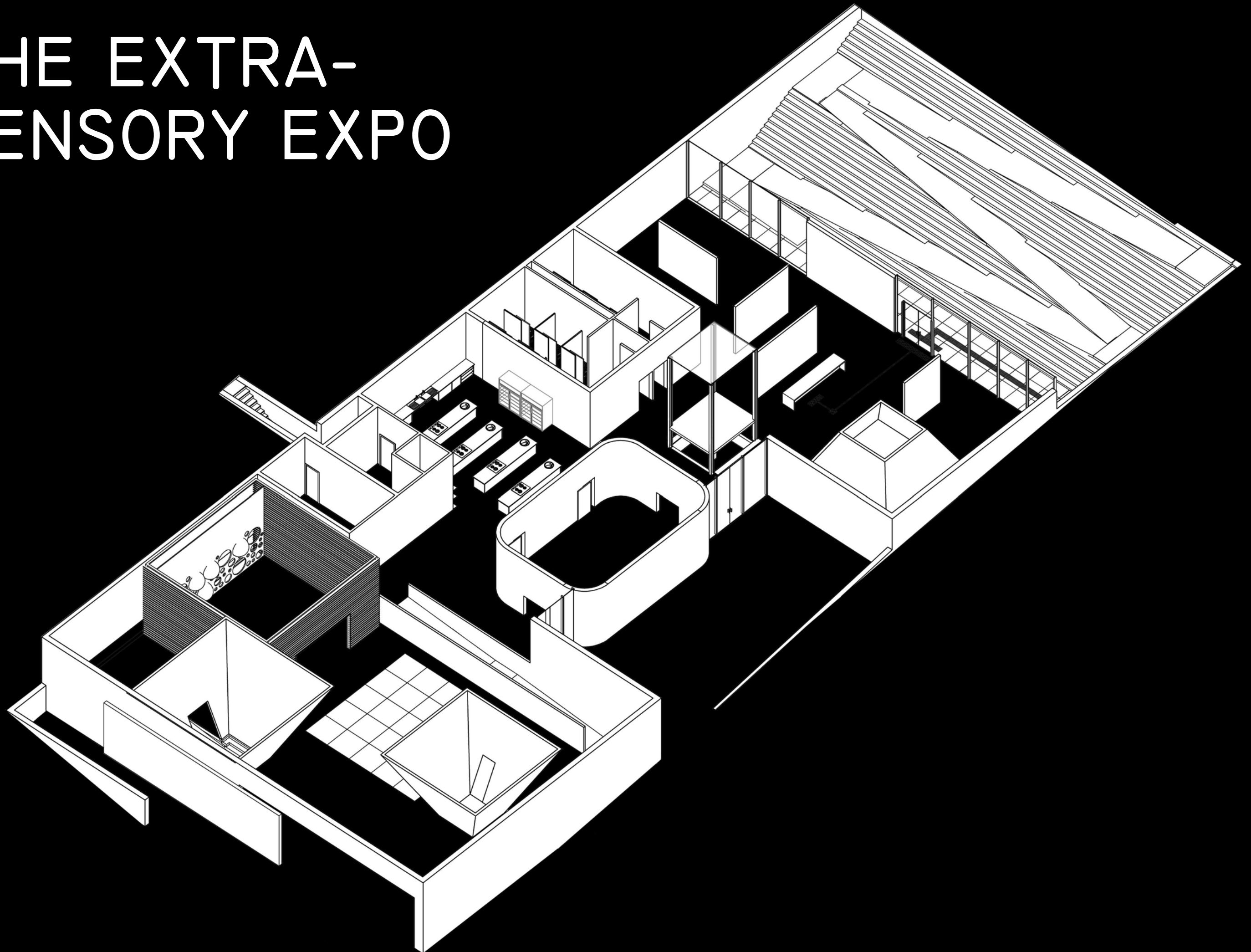
5.13. Urban morphology of Cape Town from 1654 to present.



5.14. Hidden streams in relation to the site.



THE EXTRA- SENSORY EXPO

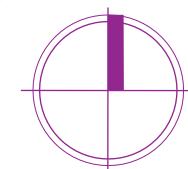
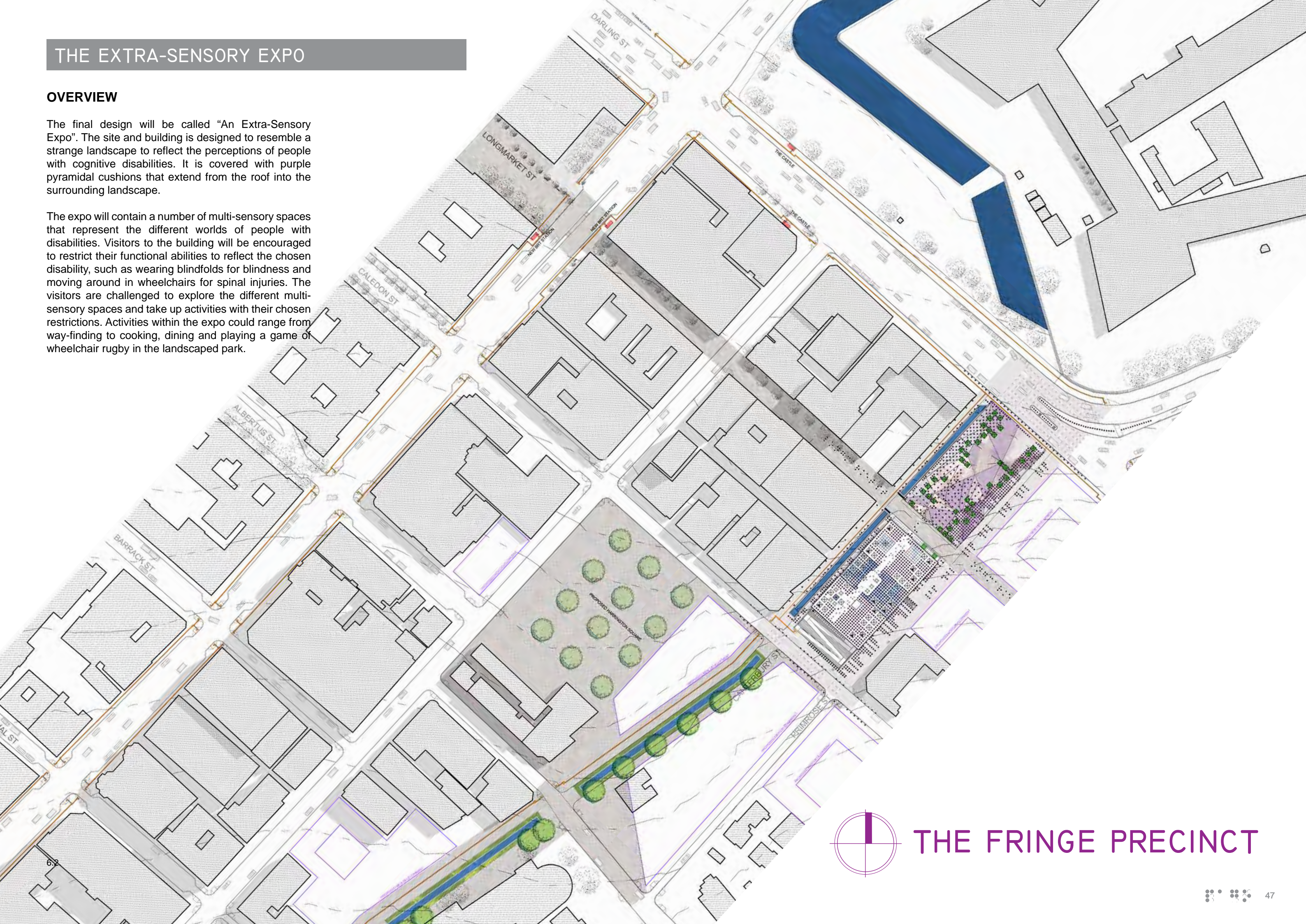


THE EXTRA-SENSORY EXPO

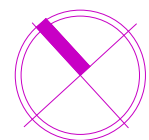
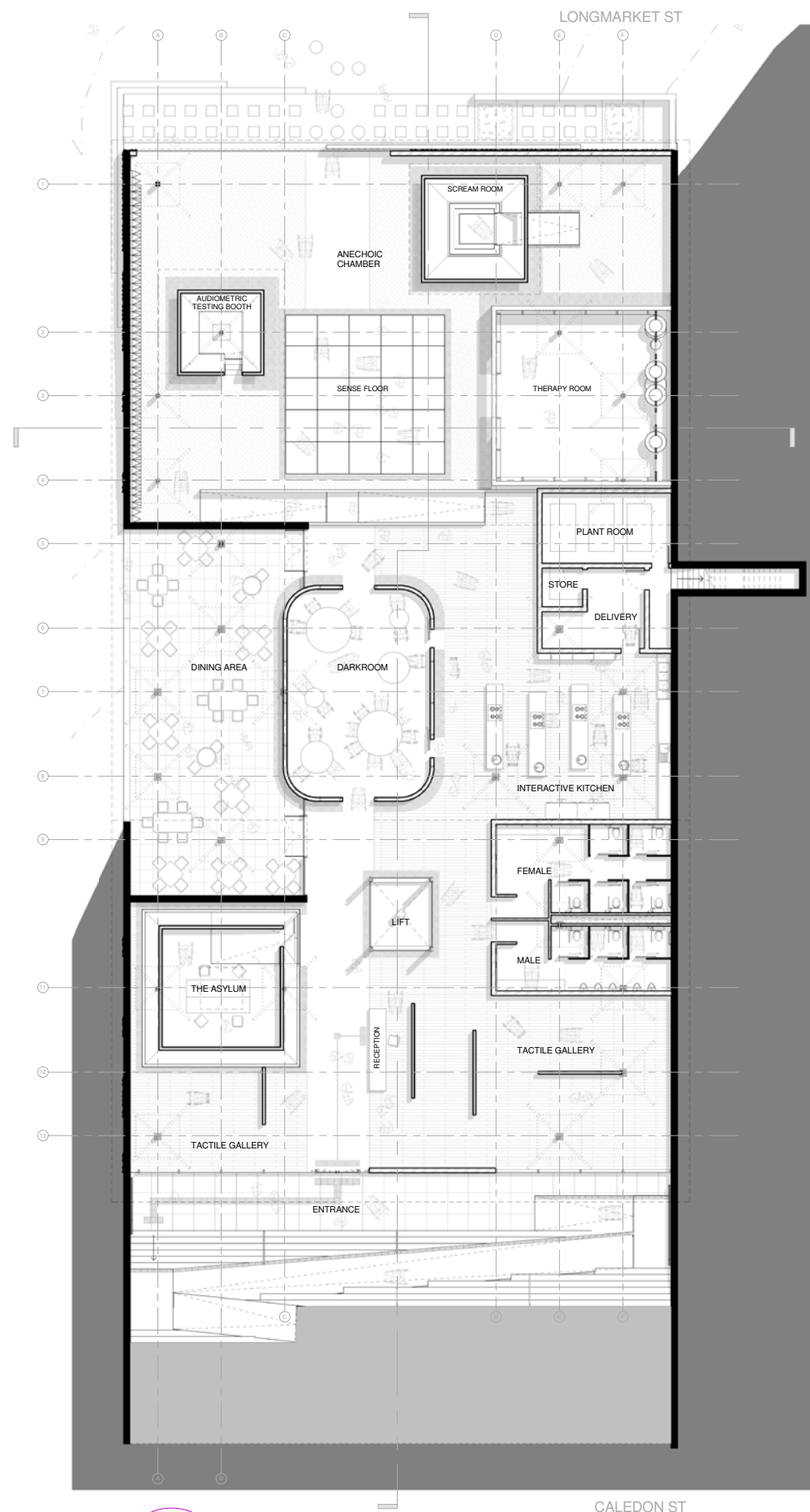
OVERVIEW

The final design will be called “An Extra-Sensory Expo”. The site and building is designed to resemble a strange landscape to reflect the perceptions of people with cognitive disabilities. It is covered with purple pyramidal cushions that extend from the roof into the surrounding landscape.

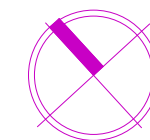
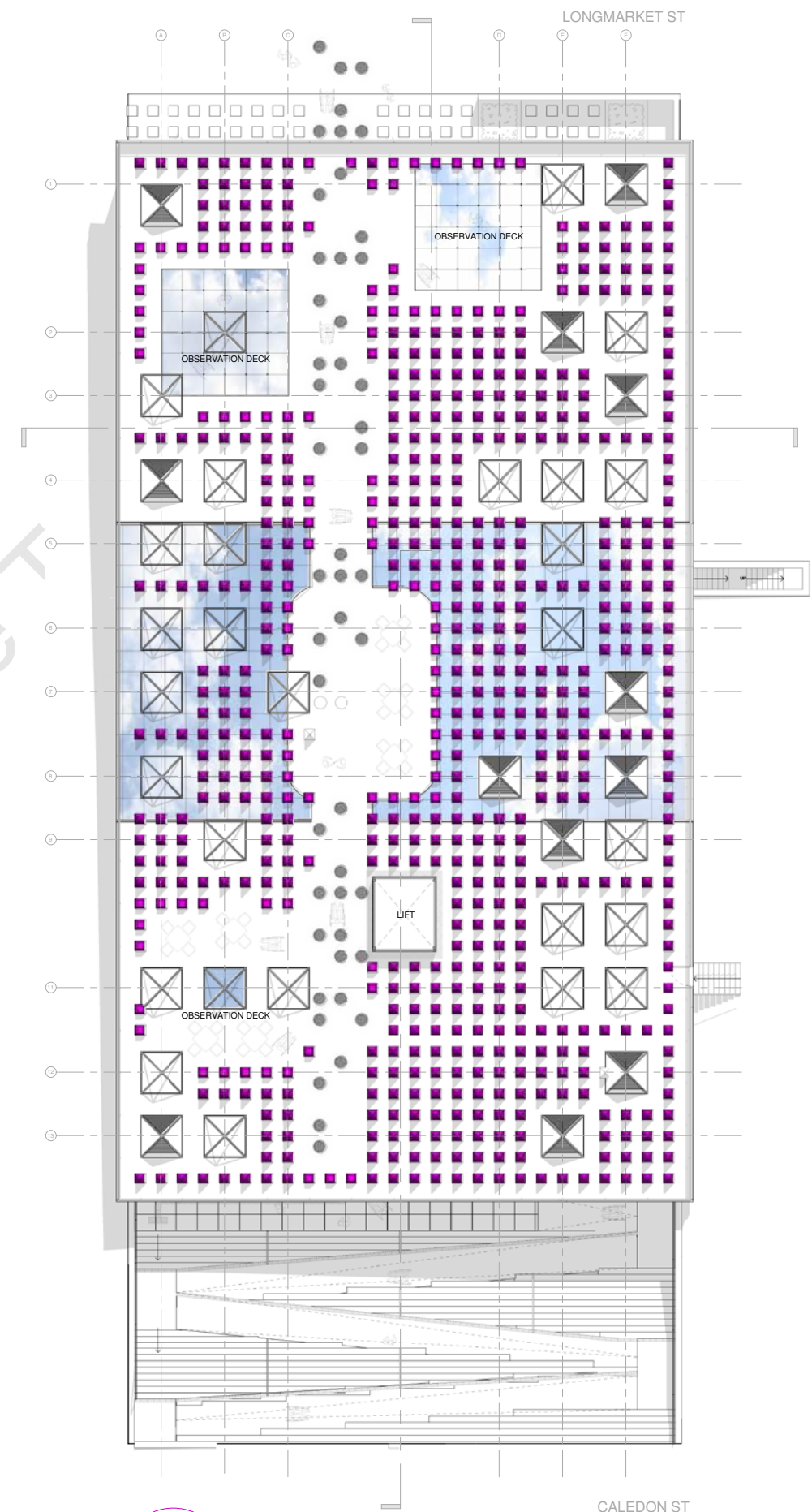
The expo will contain a number of multi-sensory spaces that represent the different worlds of people with disabilities. Visitors to the building will be encouraged to restrict their functional abilities to reflect the chosen disability, such as wearing blindfolds for blindness and moving around in wheelchairs for spinal injuries. The visitors are challenged to explore the different multi-sensory spaces and take up activities with their chosen restrictions. Activities within the expo could range from way-finding to cooking, dining and playing a game of wheelchair rugby in the landscaped park.



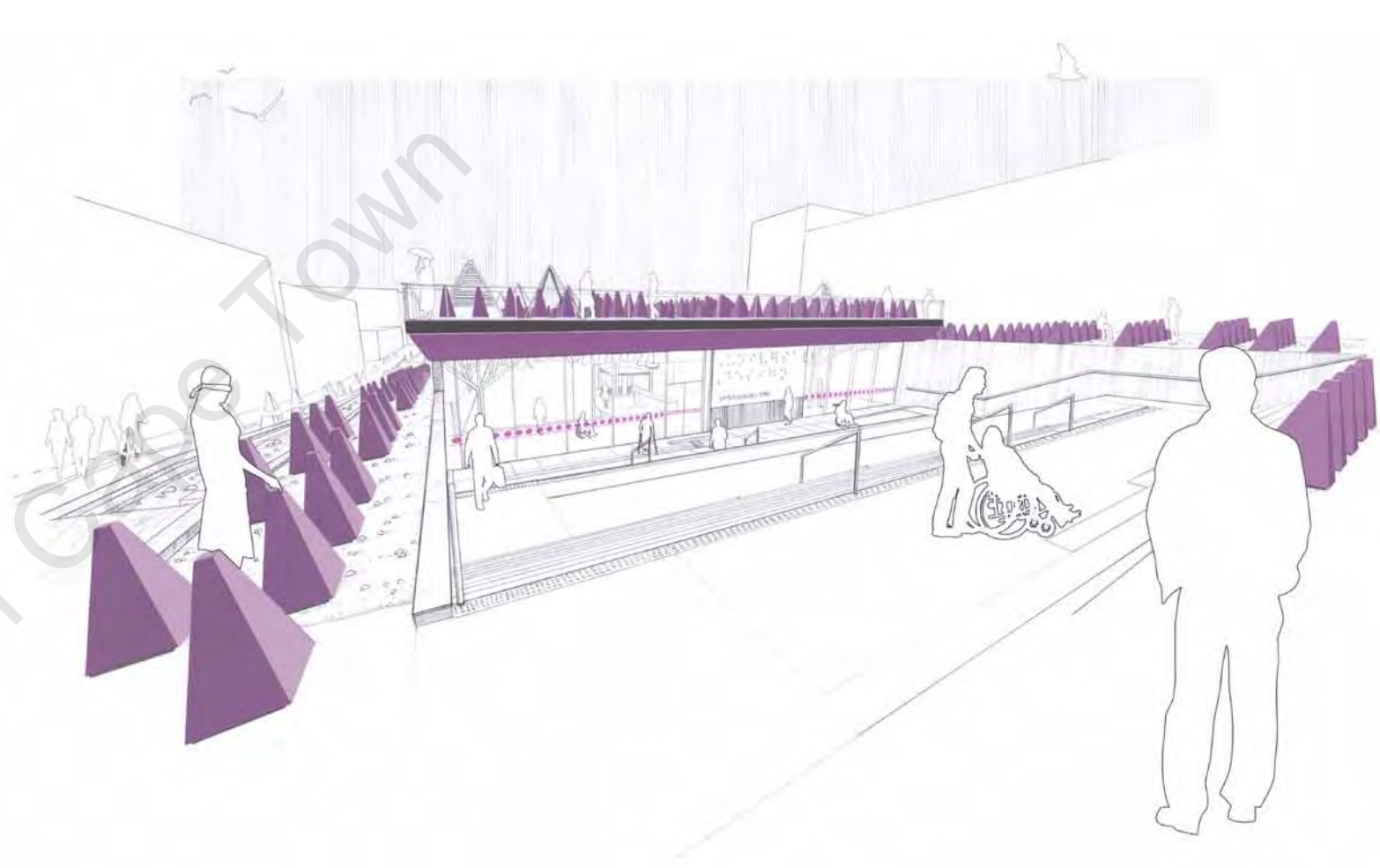
THE FRINGE PRECINCT



GROUND FLOOR LEVEL



ROOF LEVEL



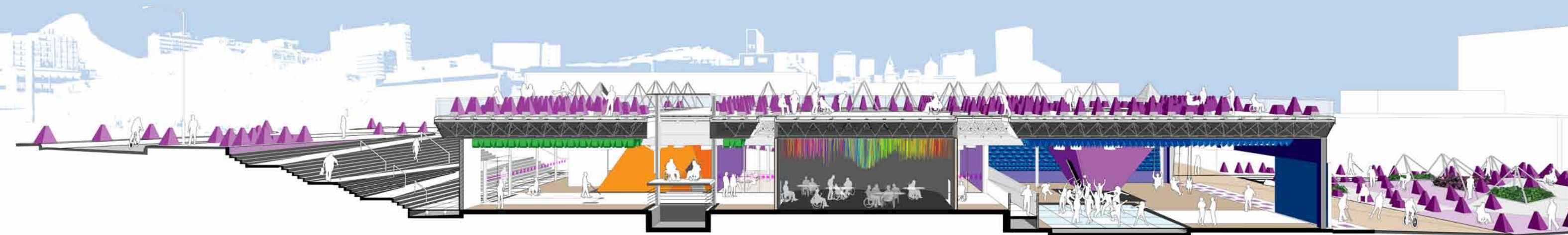
6.5.

VIEW FROM LONGMARKET STREET



6.6.

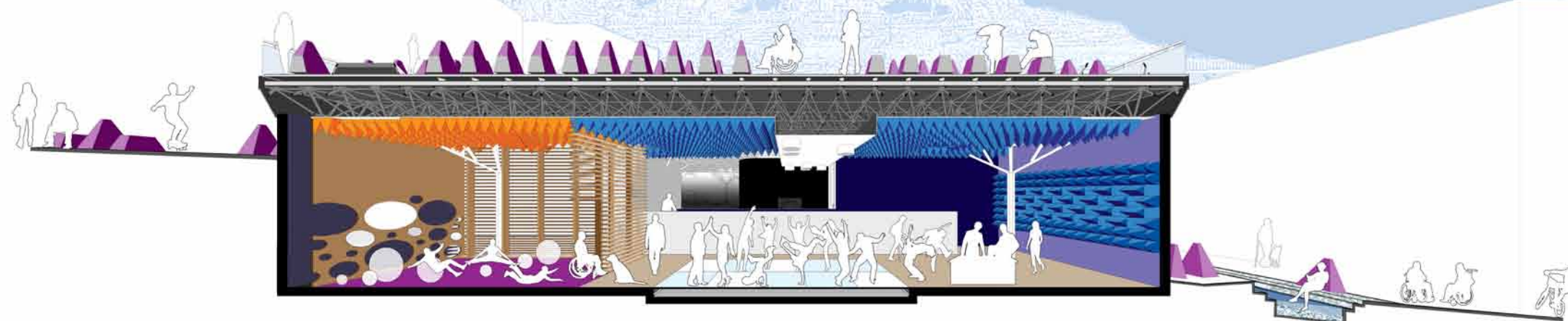
VIEW FROM CALEDON STREET



 CROSS-SECTIONAL PERSPECTIVE

6.7.

of C



 SECTIONAL PERSPECTIVE

6.8.

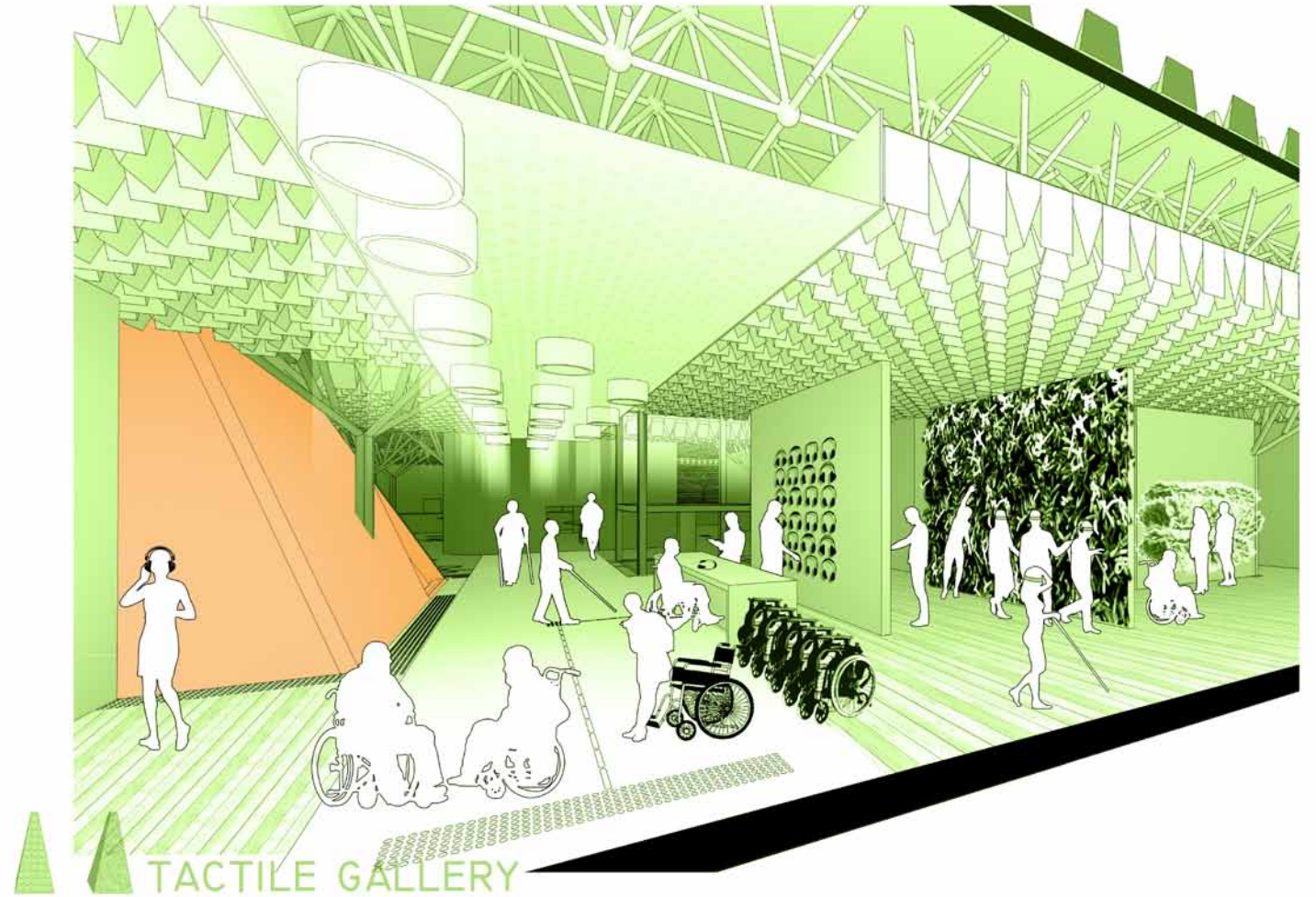
WHAT ARE THE PYRAMIDS?



The pyramidal 'wedges' are the iconic feature of the design. They are conceptualised with various possibilities for uses. These uses include concrete bollards along kerbsides, metal frames enclosing indigenous plantings, seating furniture and light fixtures to provide illumination at night. They can function as navigational aids to help blindfolded users with way-finding through difference in texture, function and placement.

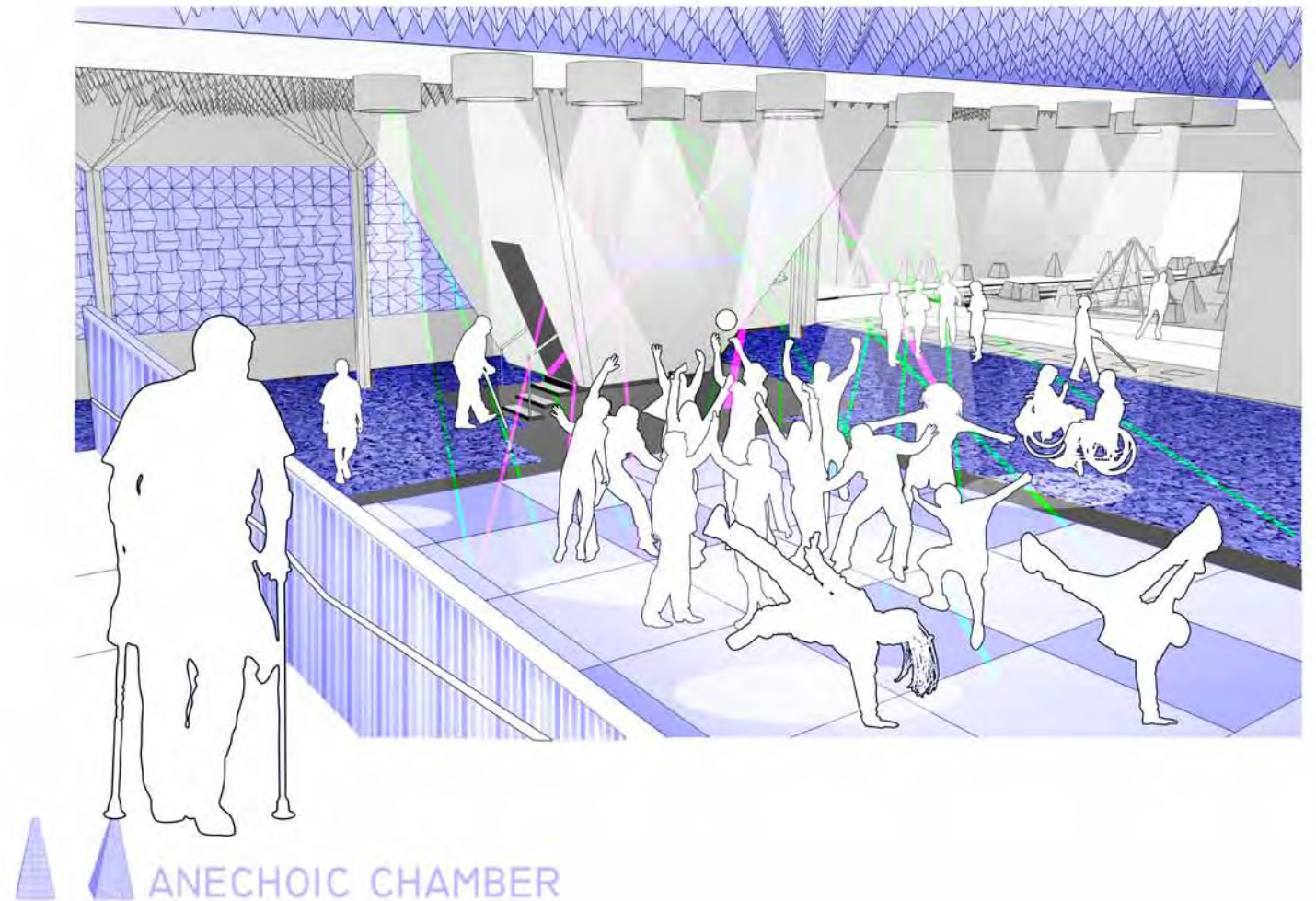
The pyramids are latex rubber foam wrapped in polyurethane or synthetic sheets. The soft materiality enhances the concept of challenging the visual perception of the environment.

6.9.



The gallery represents the world of people with sensory disabilities. Visual fields like art, design and architecture are usually appreciated by sight and there is an unwritten rule that they should not be touched. This inspired an idea of a gallery space containing haptic artworks that encourages visitors to appreciate and understand concepts through touch.

6.10.



The Darkroom represents the world of blind and visually-impaired people. It is a spatial setting for an educational initiative called "Dining in the Dark" used by blind societies. This initiative challenged sighted visitors to perform mundane tasks in the dark with limited vision and to be seated in wheelchairs to promote equity.

6.11.

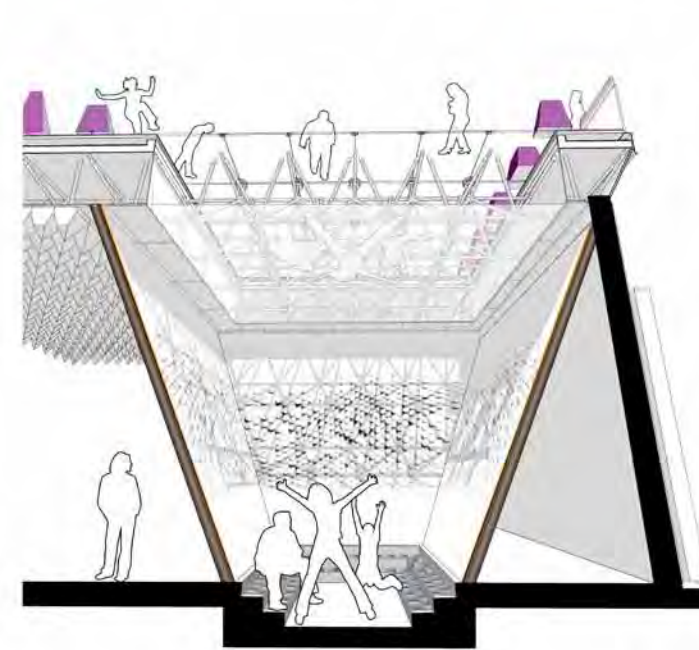


The multipurpose event venue is designed to resemble the inside of an anechoic chamber with pyramidal acoustic wedges as sound absorbers. Part of the venue is an innovative dance floor, called Sensefloor, which converts sounds and music into vibrations by the use of vibrating mechanisms to allow people with hearing loss to appreciate sounds.

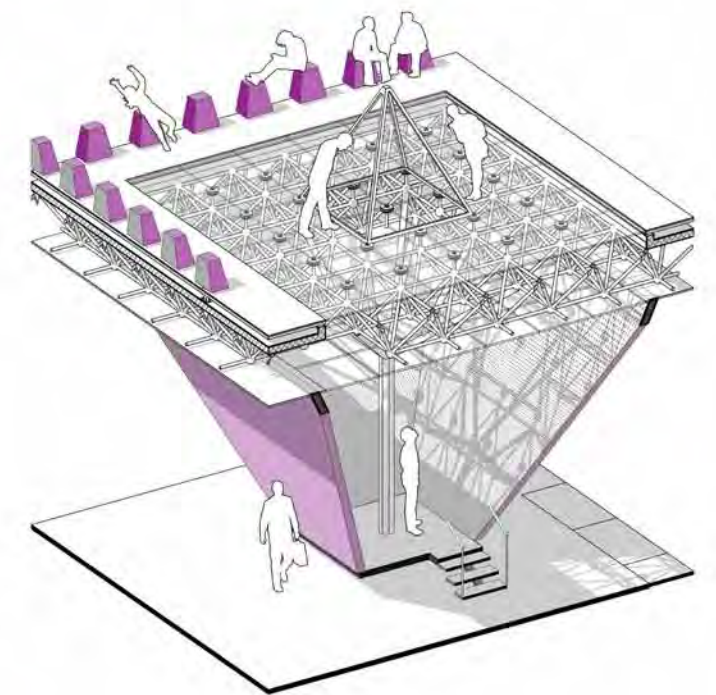
6.12.



INTERACTIVE KITCHEN



SCREAM ROOM



AUDIOMETRIC TESTING BOOTH



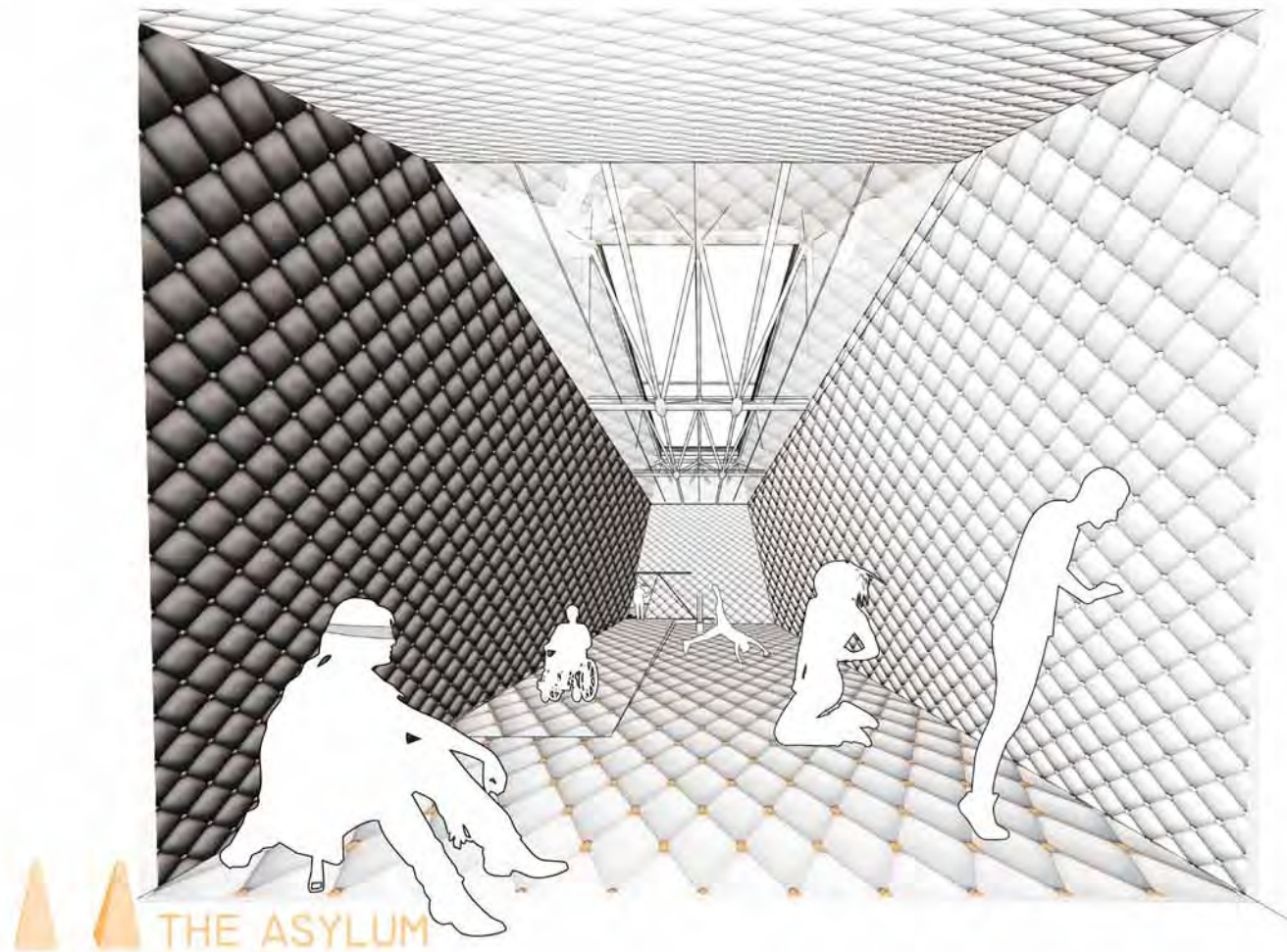
The Interactive Kitchen is a setting for an educational initiative called "Dining in the Dark" which challenges all users to perform mundane activities with their chosen bodily restrictions. Imagine the challenge of making a simple cup of coffee with no arms or blindfolded. The aim is to understand the daily challenges of people with disabilities.

6.13.



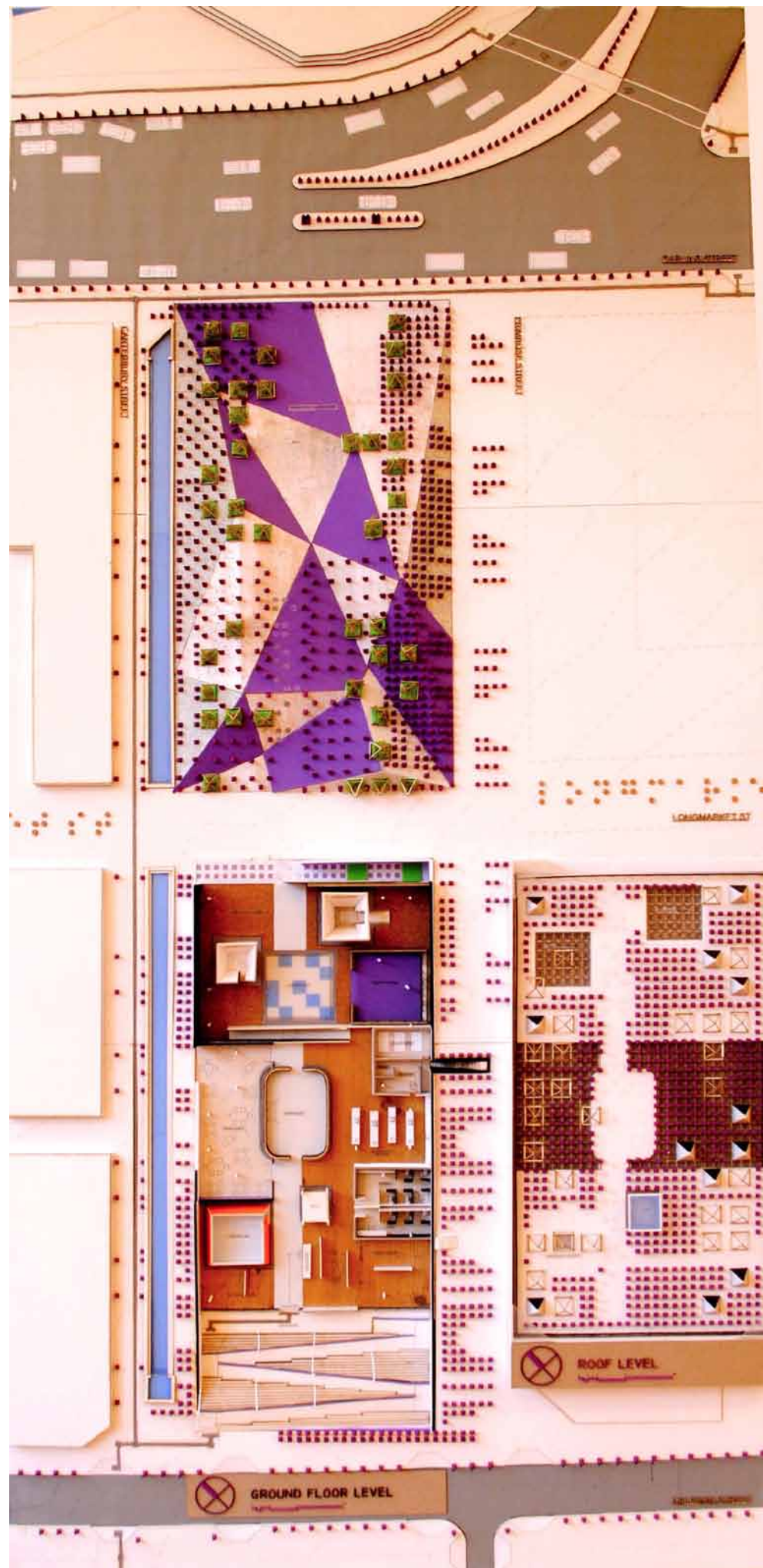
The Scream Room and Audiometric Testing Booth represents the world of people with hearing loss. These spaces are acoustically isolated from the Anechoic Chamber and have observation windows for skylight to open up the internal activities for public viewing from above.

6.14.

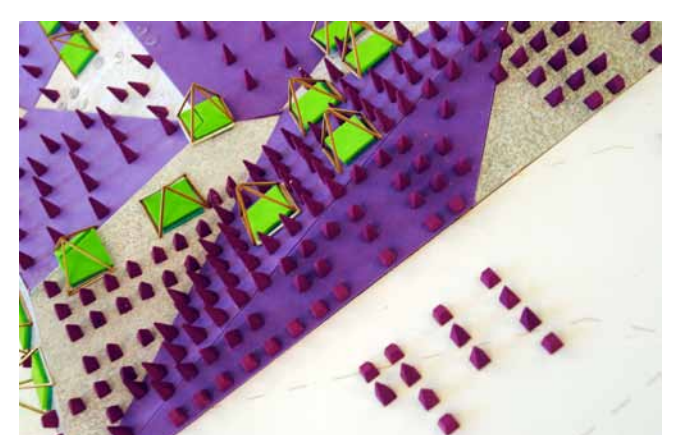
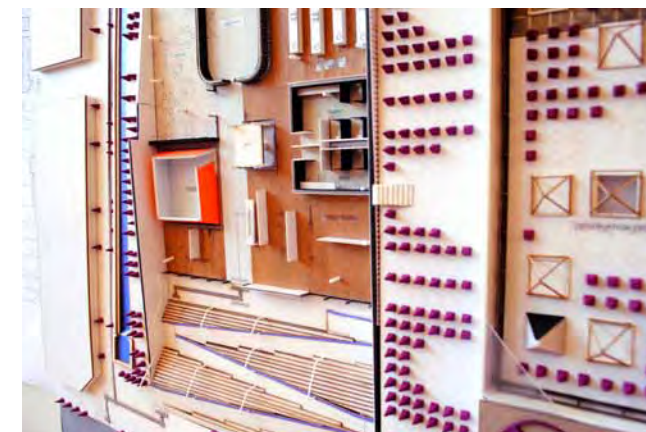


The Asylum represents the world of people with cognitive disabilities. As the name suggested, it is a padded cell with an observation window for a skylight. The cell can be used as an administration space, or a meeting space for therapy sessions and quietness.

An Induction Loop System is used in conjunction with assistive hearing devices and installed in spatial setting for verbal conversations. It is basically a copper wire running around the perimeter of a room connected to a microphone. A hearing-impaired user can adjust the setting of assistive hearing devices to pick up the sounds transmitting through the copper wires.



6.17.



6.18. Final model of the Extra-Sensory Expo at 1:100

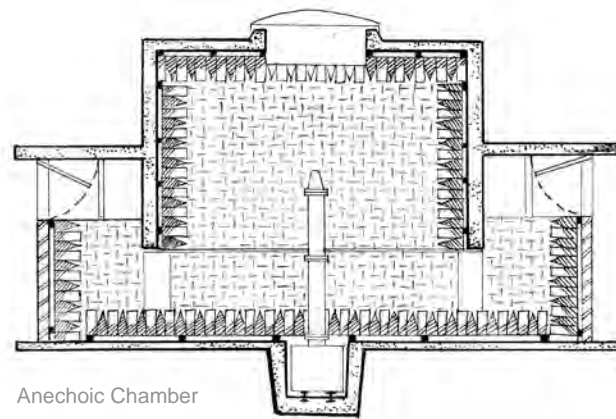
INITIAL CONCEPT

I adopted the iconic pyramidal wedges from the anechoic chamber as a tactile and landscaping element. The pyramidal 'wedges' are taken out of context and applied to the brownfield site to transform it into a textured surface. This created a strange landscape of oversized wedges with a visual impact.

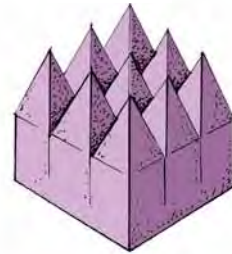
The narrow site is divided by Longmarket Street which connects Cape Peninsula University of Technology's main campus to the CBD. This results in two separate terrains with the southern part as a building site and the northern part as a landscaped terrain functioning as a sound barrier along the busy Darling Street.

The initial concept for the building is a rectangular, space-framed structure with an open-plan to allow for flexibility in spatial configurations and future adaptations. The building is set four meters into the ground for passive cooling and to blend into the landscape by allowing the iconic pyramids to extend from the roof space to the surroundings. This strategy ensures that the existing panoramic views of the Castle and Table Mountain are retained.

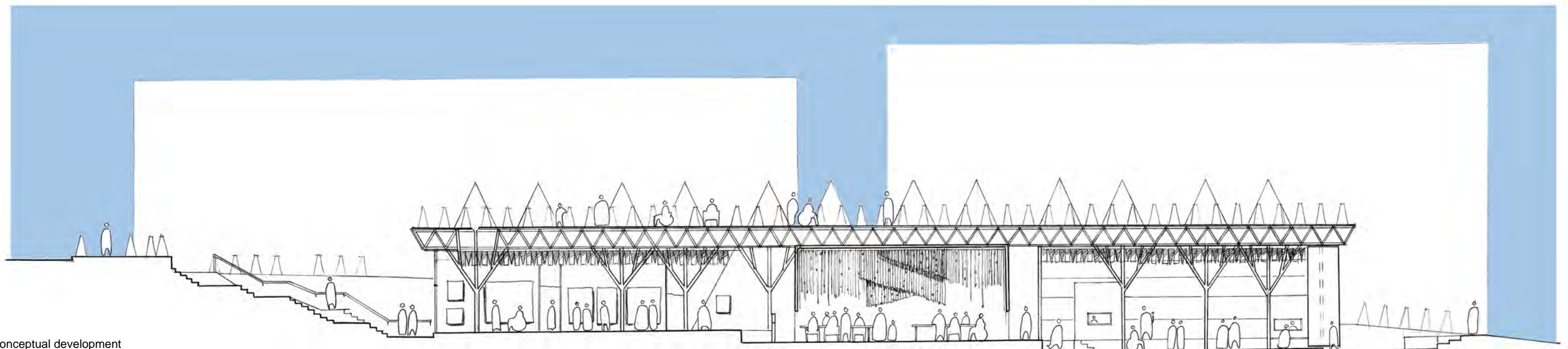
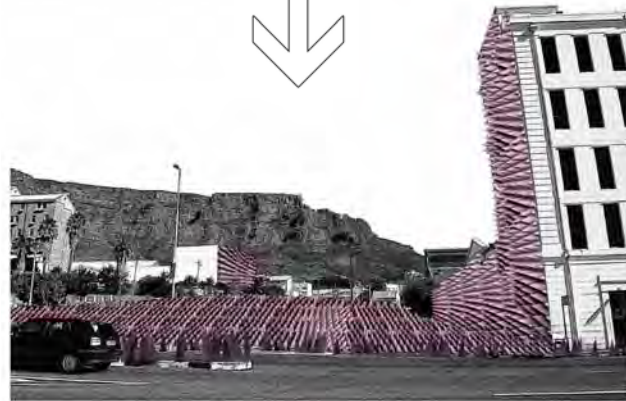
I took the accessibility guidelines and proposals from the draft Fringe Urban Design Framework into consideration during the design development process (see Appendix III). This included the closure of roads and transforming Canterbury St into a reclaimed landscape into the design brief.



Anechoic Chamber



Acoustic wedges

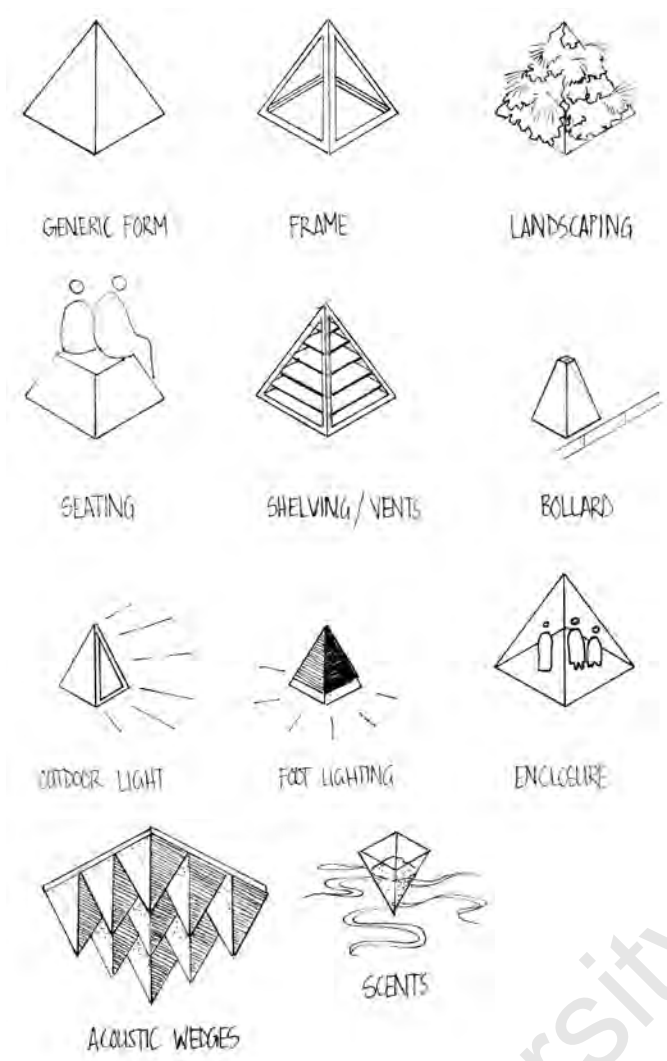


PYRAMIDAL FOAM CUSHIONS

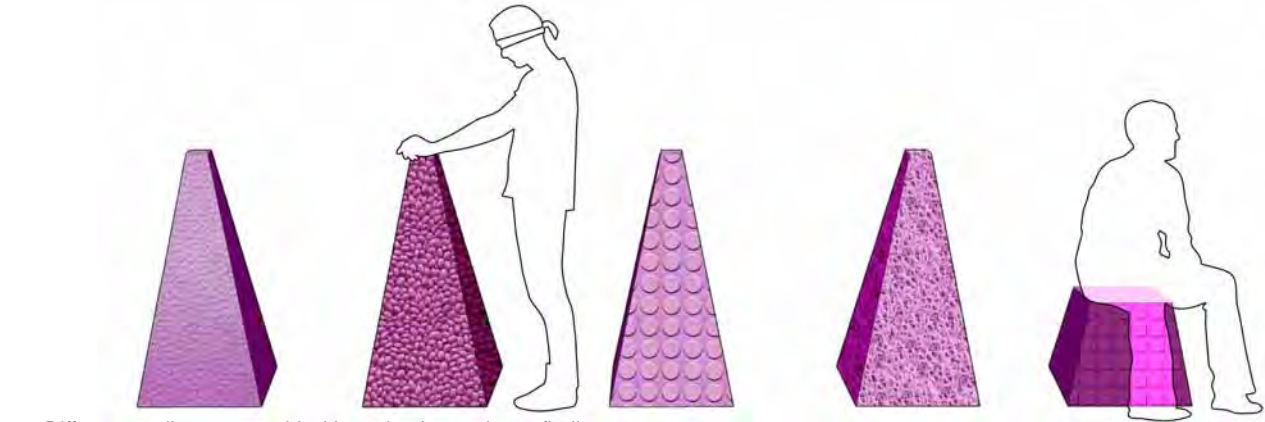
The pyramidal ‘wedges’ are the iconic feature of the design. They are conceptualised with various possibilities for uses. These uses include concrete bollards along kerbsides, metal frames enclosing indigenous plantings, seating furniture and light fixtures to provide illumination at night. They can function as navigational aids to help blindfolded users with way-finding through difference in texture, function and placement.

The oversized “wedges” can be constructed of latex rubber foam wrapped in polyurethane or synthetic sheets. The soft materiality adds to the concept’s playful nature by providing protection against falls and impacts..

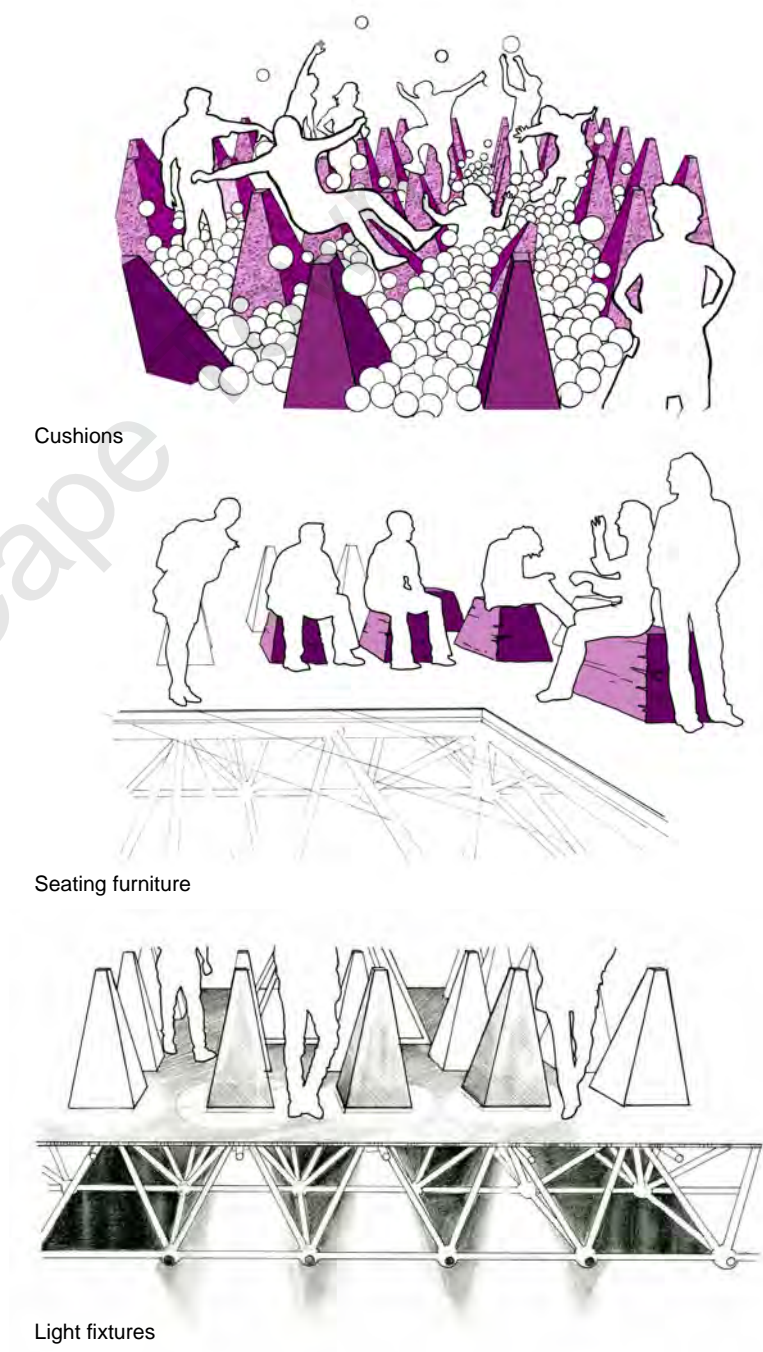
The larger pyramids on the building’s roof are conceptualised as solar chimneys and wind catchers to aid with passive ventilation of the interiors. Some of the larger pyramids on the roof are decorative metal frames marking the locations of columns below. I used Braille messages for composition and layout of the large pyramids.



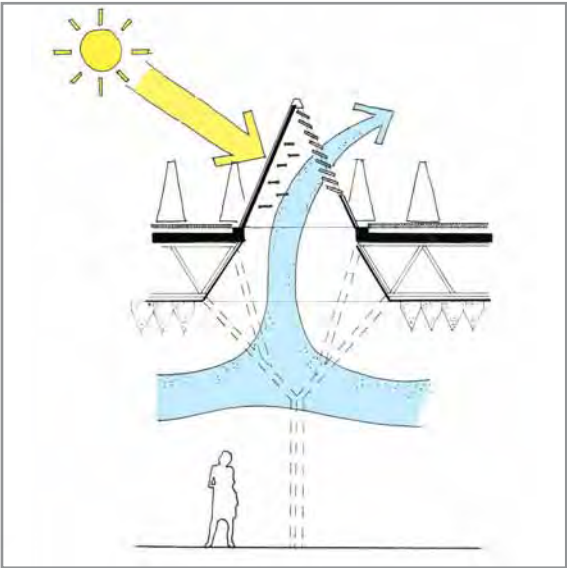
7.2. Pyramidal typologies.



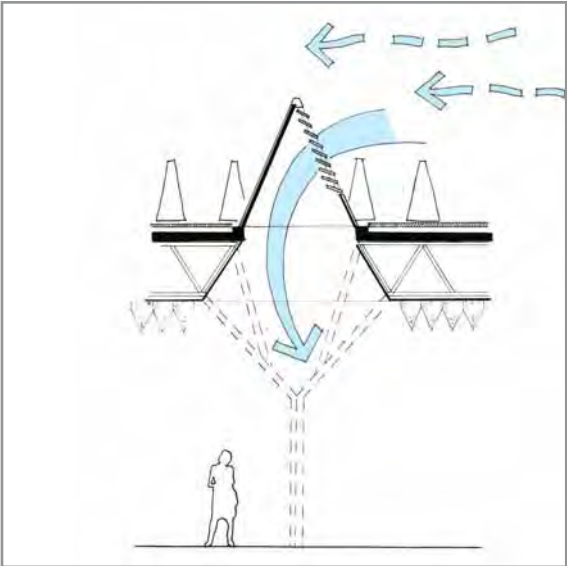
7.3. Different tactile coats to aid with navigation and way-finding.



7.4. Main uses of pyramidal foam cushions.

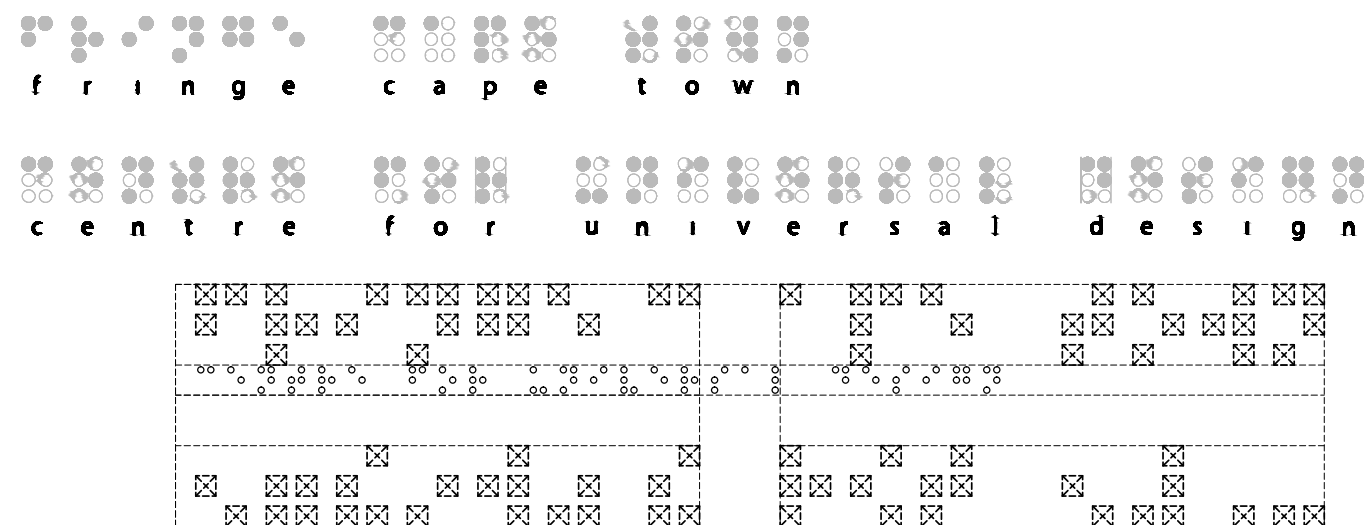


Solar chimney concept



Wind-catcher concept

7.5. Passive ventilation strategies.



7.6. Braille composition of pyramids.



7.7. Placement of pyramidal typologies.

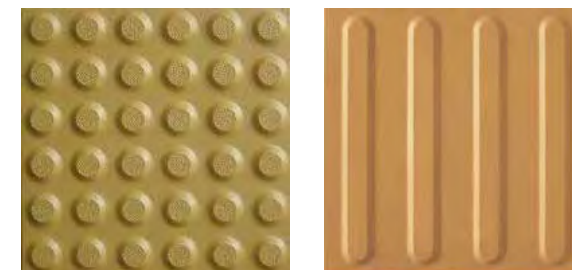
TACTILE GROUND SURFACE INDICATORS

In addition to the pyramidal cushions being a navigational tool, I investigated the application of Tactile Ground Surface Indicators (TGSIs) to the urban context to improve accessibility. The practicality and use of TGSIs was discussed with Jeremy Opperman, a visually-impaired consultant on disability issues. Our initial meeting involved a 1/500 scaled model of the urban context and a discussion on the available assistive technologies to aid with way-finding and orientation. Opperman is familiar with the layout of Cape Town CBD with the aid of mnemonic, sensory cues and his reliable guide dog (See Appendix I). He explored the contextual model with his hands and is surprisingly familiar with the streets layout. The significant revelation for him was the form of the star-shaped Castle.

We discussed what assistive technologies and way-finding strategies are available for blind and visually-impaired people such as talking signage, tactile maps and Google Indoor Map application on smartphones. Opperman supported the views expressed by the interviewees on accessibility and TGSIs in my research process (See Appendix I). Most visually-impaired people regarded TGSIs as unreliable due to the lack of awareness and mobility training on utilising the tiles (Daniel, 2013; Davies, 2013; Opperman, 2013). Additionally, TGSIs tiles are relatively new to the local built environment and are not prevalent in major urban areas.

Nevertheless, the site and the Extra-Sensory Expo should be accessible to the public and inclusive of all users. Extending the TGSIs tiles from the MyCiti bus station to the surrounding precinct will improve navigation and mobility to the site. I proposed the TGSIs routes to be practical and lead the users between the MyCiti bus stations and to fixed landmarks like the Parliament. The careful planning of the TGSIs routes could aid blind and visually-impaired people with their mnemonic and be used as a point of reference for orientation.

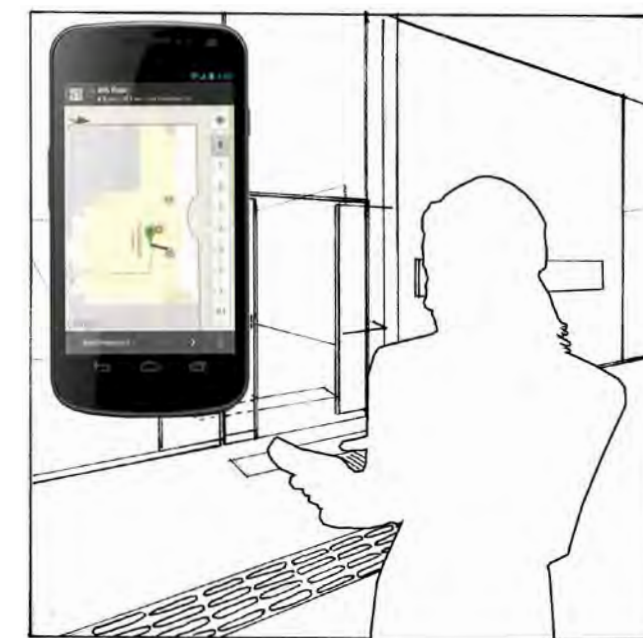
I used the SANS 784:2008 guidelines for tactile indicators to ensure correct application of TGSIs tiles in the Fringe Precinct and within the building.



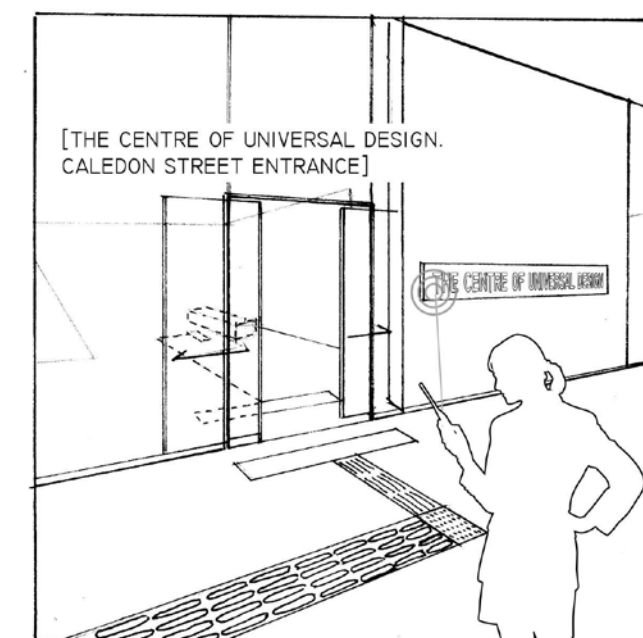
7.8. Typical TGSIs warning indicator and directional indicator.



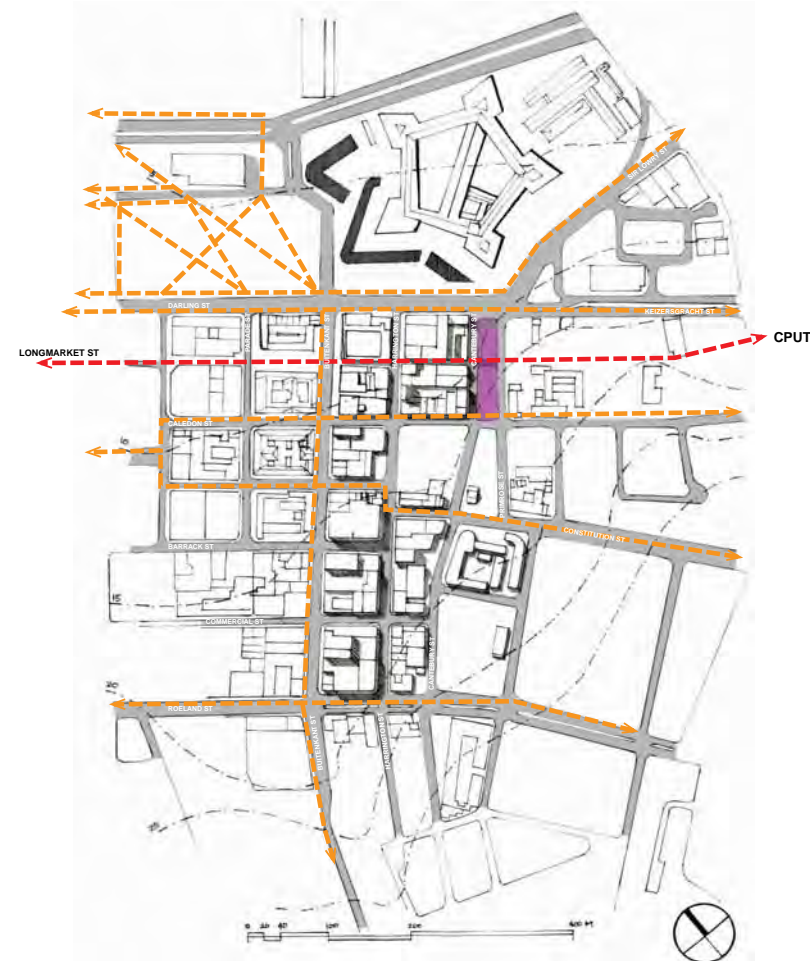
7.9. Jeremy Opperman with the contextual model.



7.10. Google Indoor map application on smartphones.



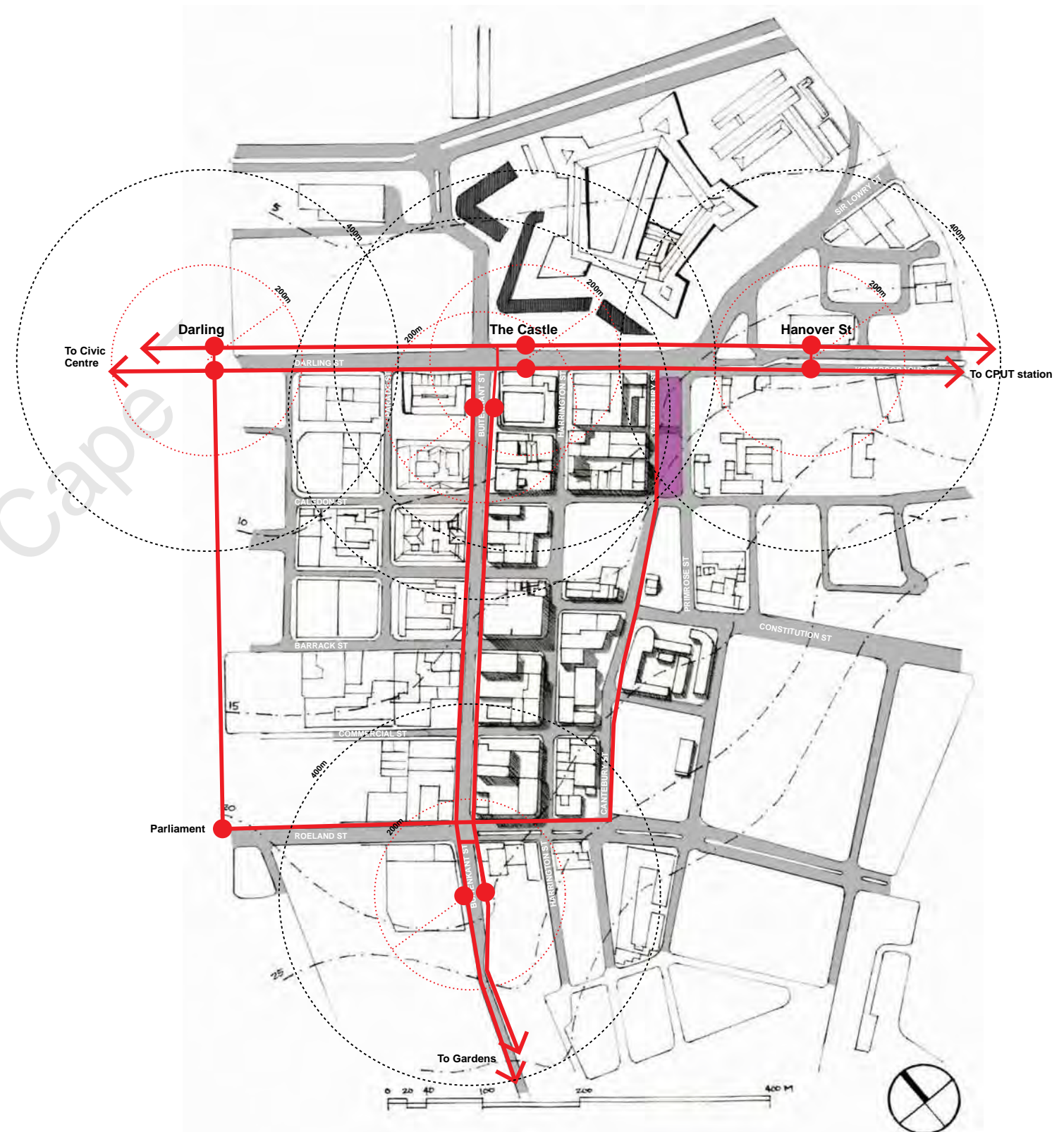
7.11 Talking signage, verbal identification of places with a remote.



7.12. Pedestrian networks.

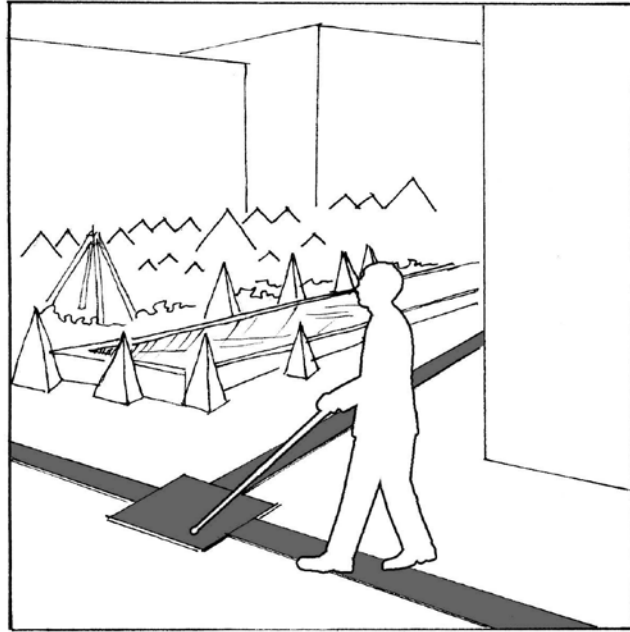


7.13. MyCiti bus stations and routes.

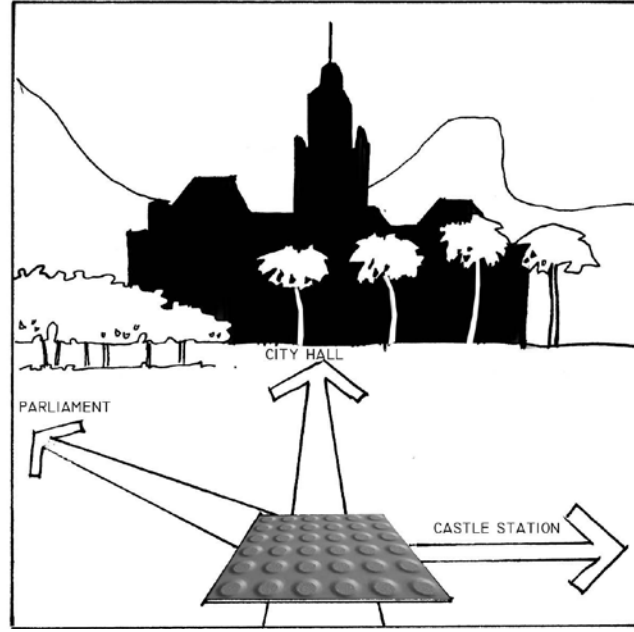


7.14. Proposed routes for TGSi.

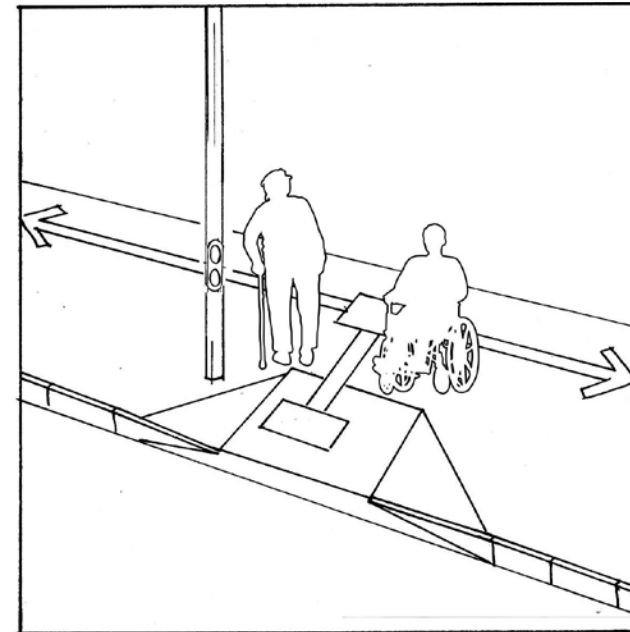
7.15. Next page. Illustrations on integration of TGSi tiles into final design.



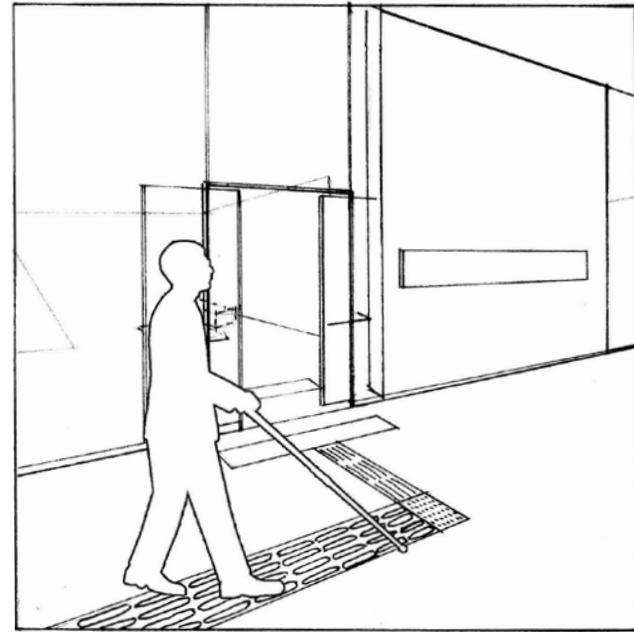
Proposed routes for TGSi along Darling St.



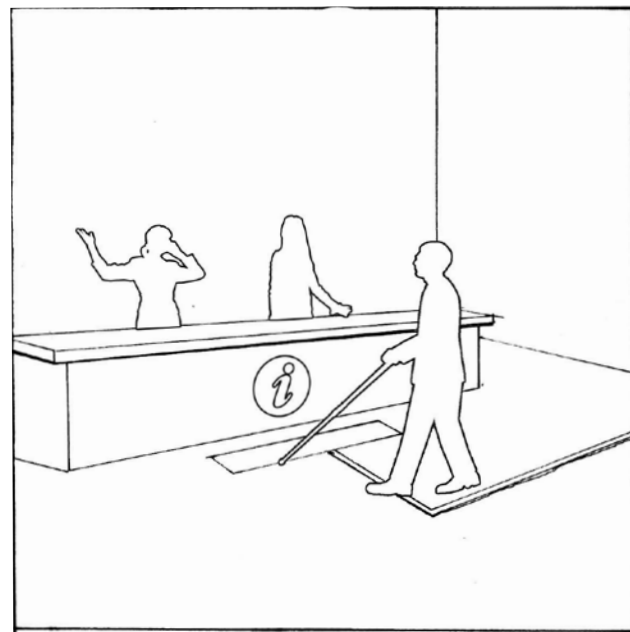
Logical routes of TGSi toward MyCiti bus stations and landmarks.



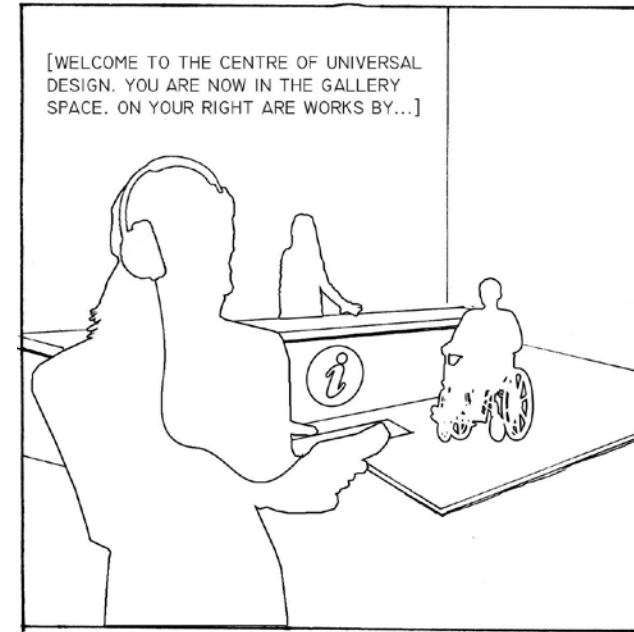
Integrate TGSi & drop-kerb as per SANS 784:2008.



TGSi should guide the user to the building entrance.



Interior use of TGSi leading to the reception or information desk.

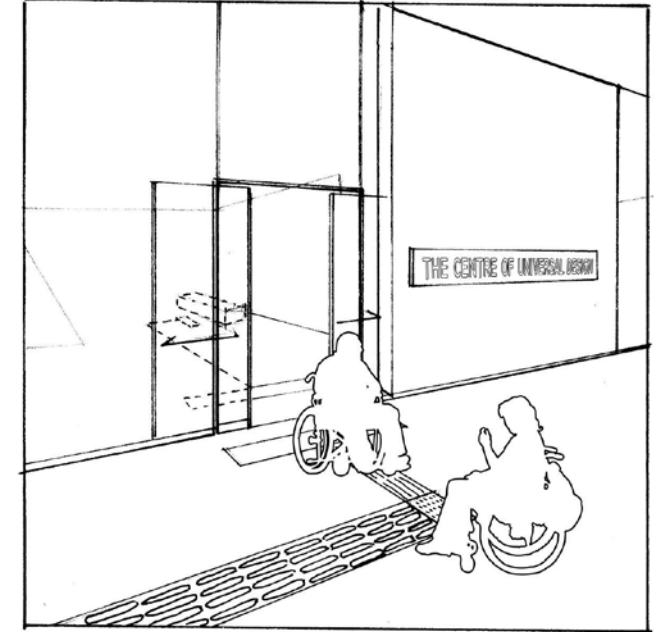


Audio guides and audio descriptions should be provided.

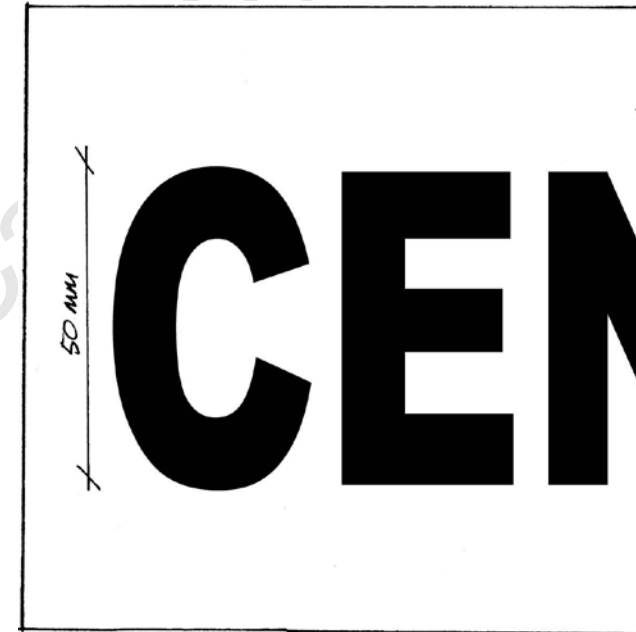
ACCESSIBILITY STRATEGIES

I have taken Universal Design principles and other accessibility strategies beyond TGSi into consideration during the design development process.

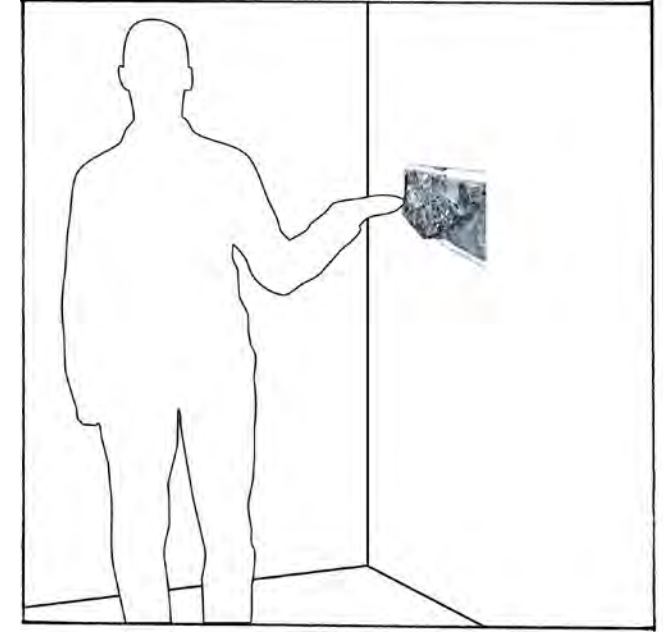
Most of the accessibility requirements and guidelines are provided by the National Building Regulation SANS 10400, Part S: Facilities for persons with disabilities. I have illustrated the integration of these guidelines and assistive technologies into the final design of the Extra-Sensory Expo.



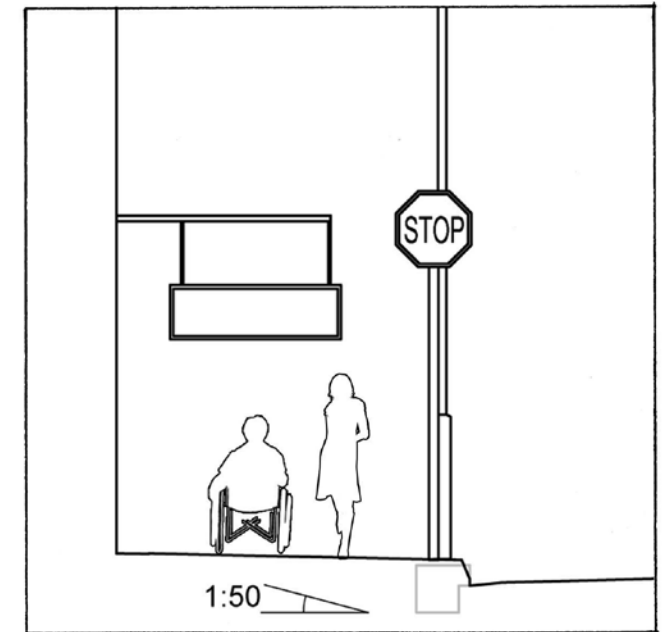
At least one accessible entrance.



Minimum 50mm height for text in signage.

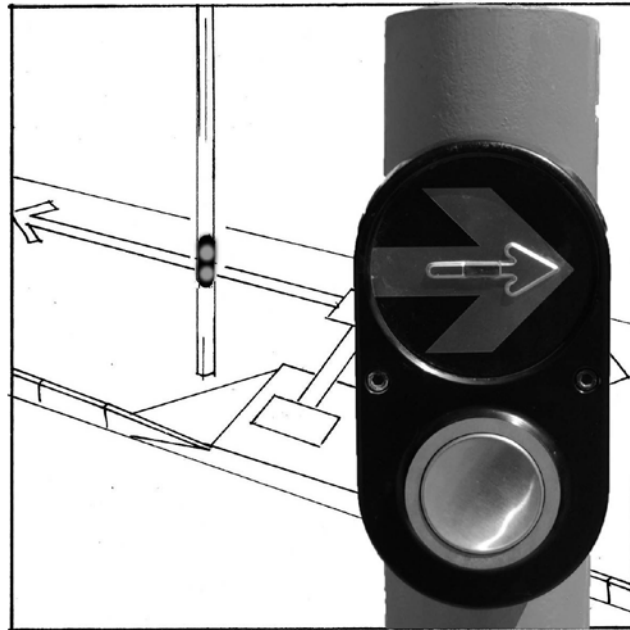


Use fixed tactile elements as markers.



Minimum slope for pavement.

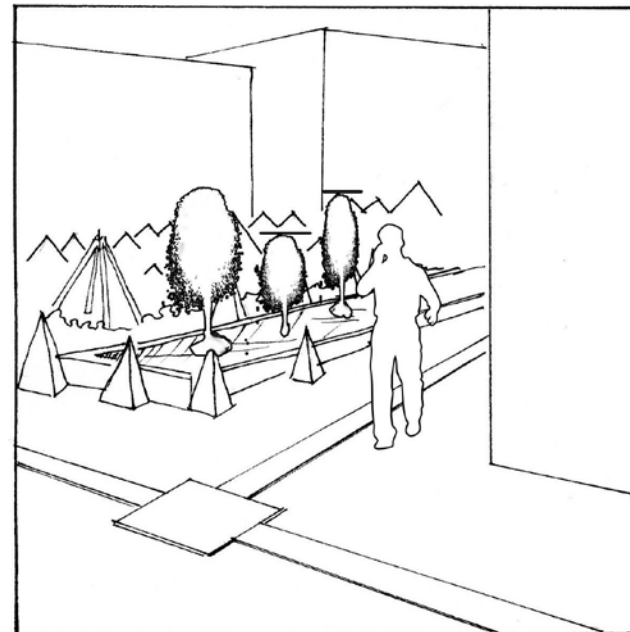
7.16. Illustrations on integration of accessibility strategies into building design.



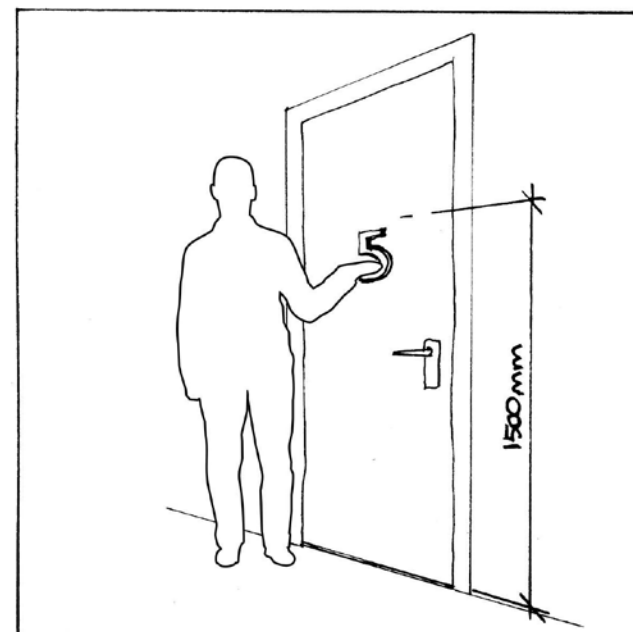
Audible traffic signals at traffic lights.



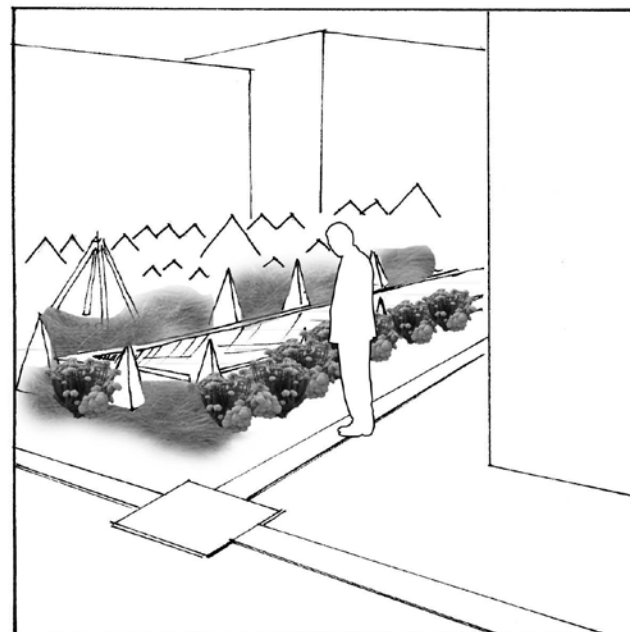
Use internationally recognised symbols and signage.



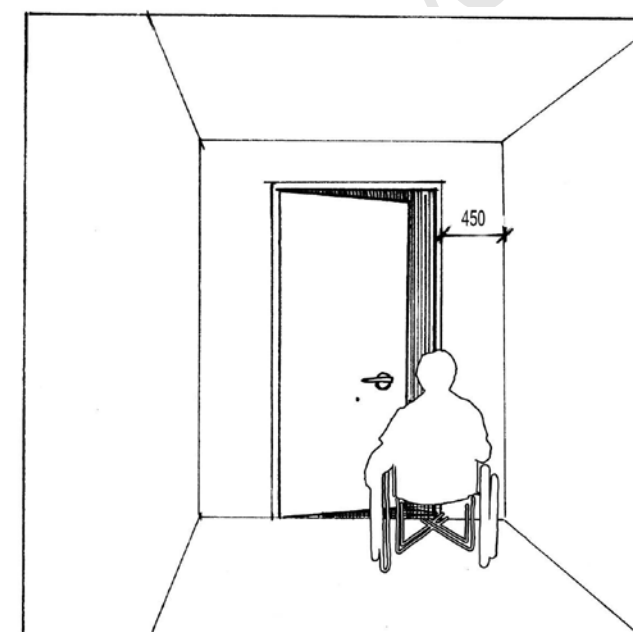
Using the rehabilitated stream to aid with sensory cues.



Raised texts on doorways.



Indigenous planting with identifiable scents.

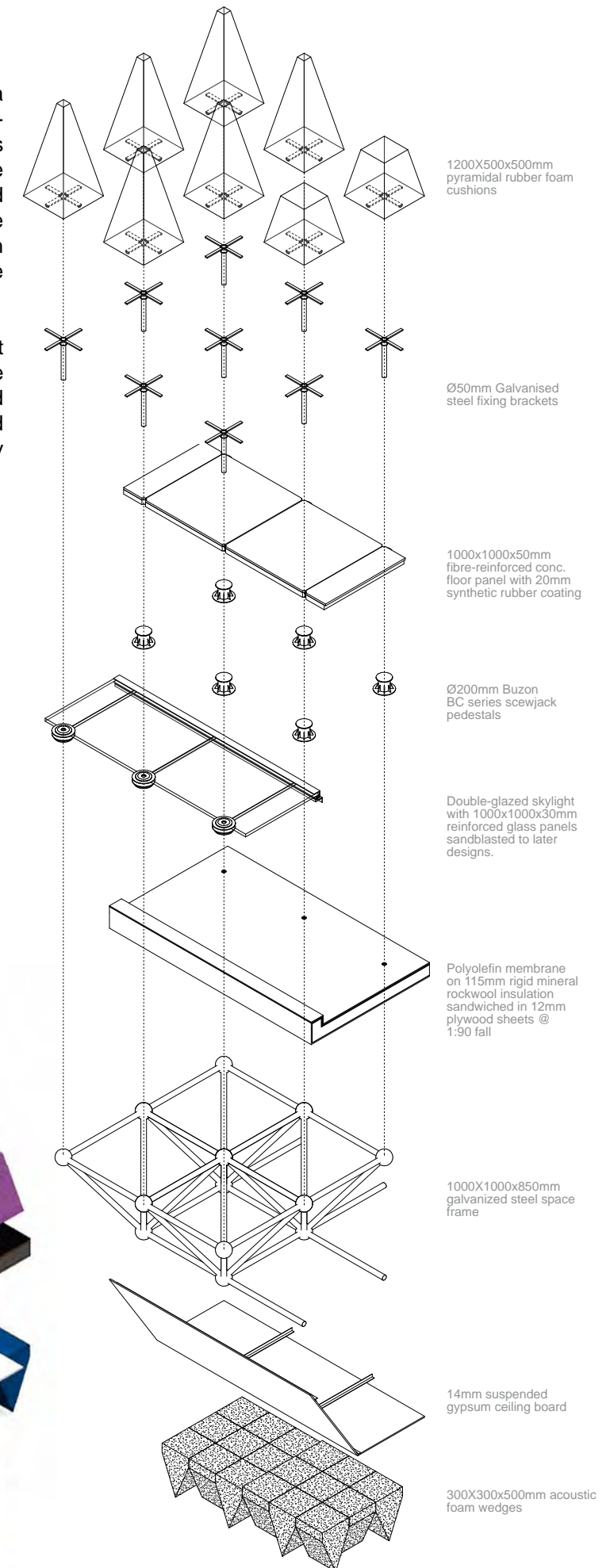
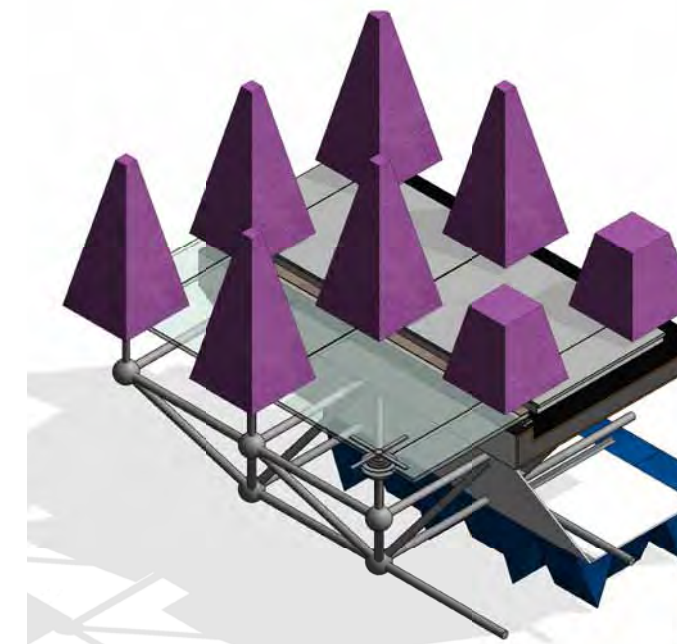


Minimum nib of 450mm for doorways.

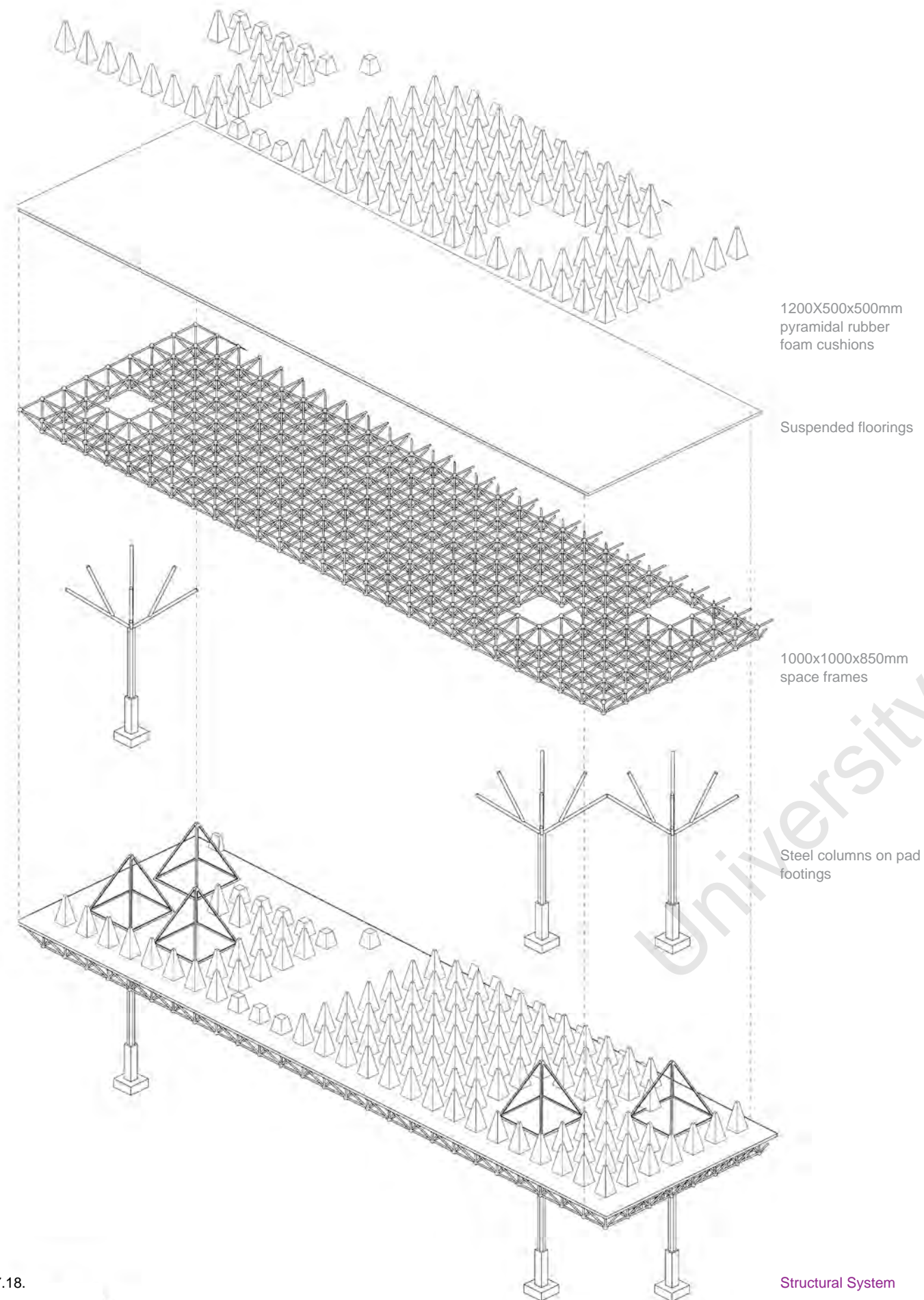
TECHNICAL STUDIES

The Extra-Sensory Expo was conceptualized as a 27x50m space frame structure suspended by steel tree-like columns. The space frame structure was chosen as an extension of the pyramidal form. The layout of the columns corresponds to the Braille message devised for the pyramids on the roof. The foam cushions are designed to strap onto the fixing brackets, which in turn is screwed into the nodes of the space frame structure below.

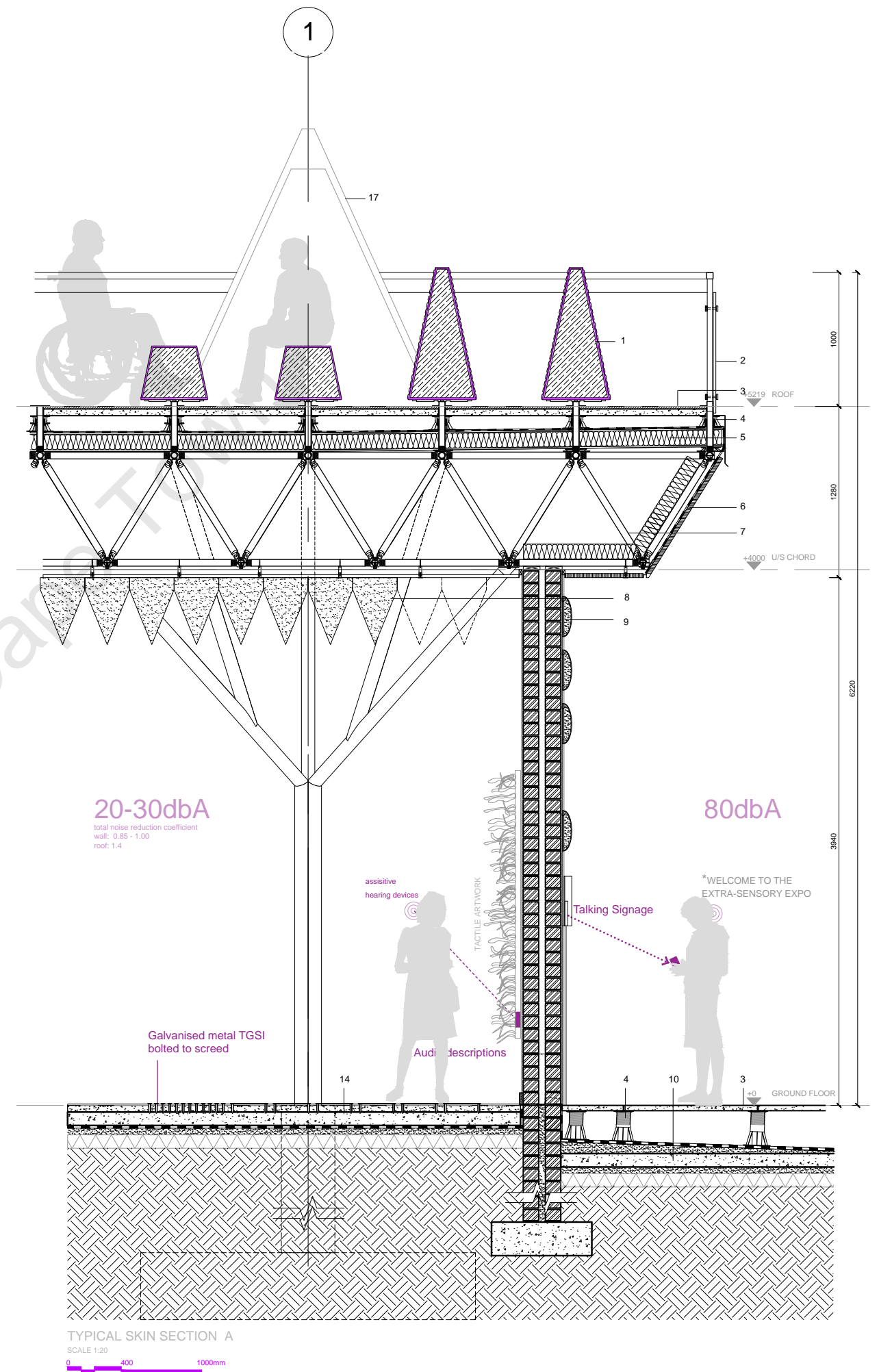
The trafficable roof can be accessed by a platform lift in the center of the expo. Certain parts of the roof are double-glazed skylights with 30mm thick reinforced glass. The skylights admit light into the interiors and function as observation windows into the multi-sensory spaces below.



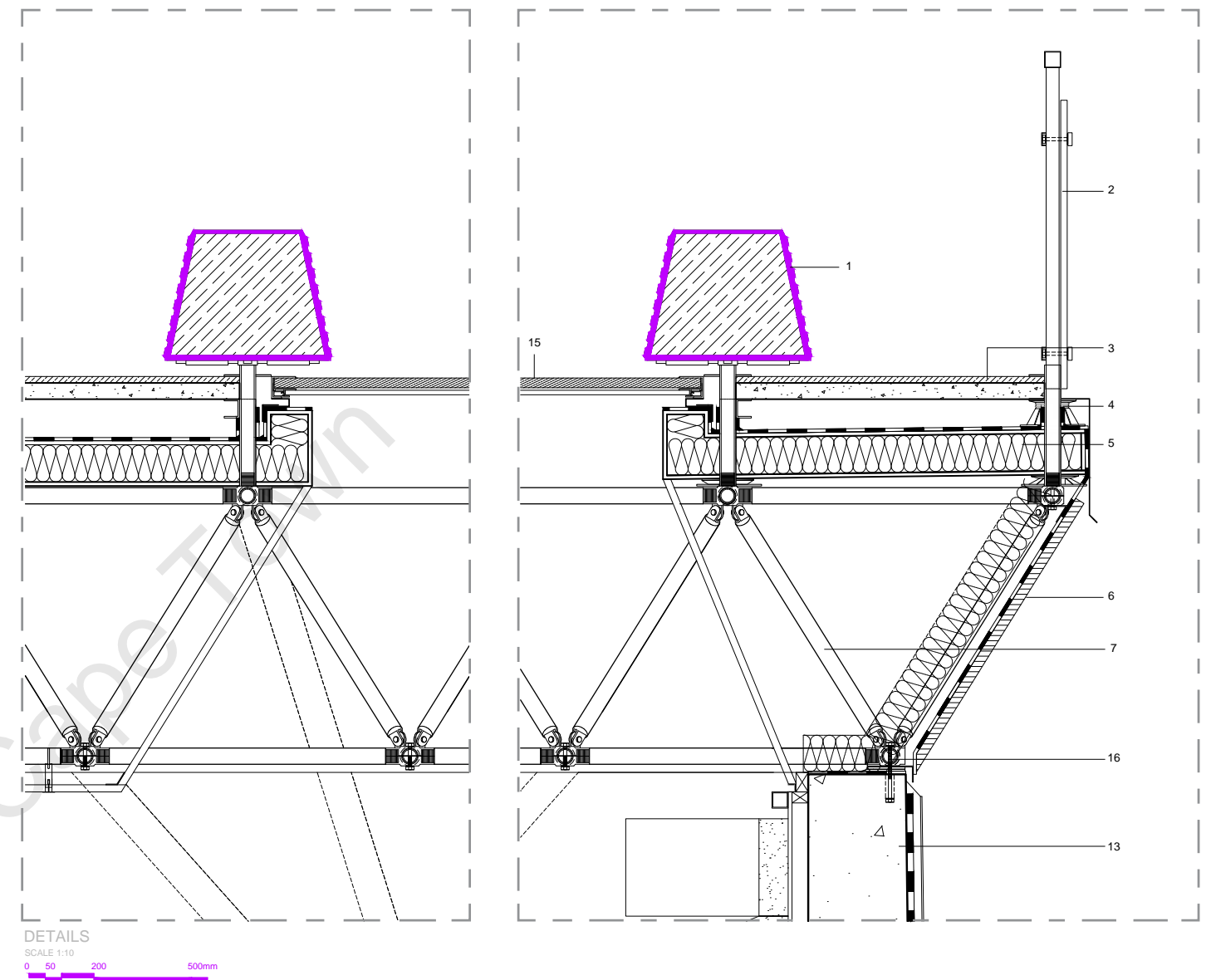
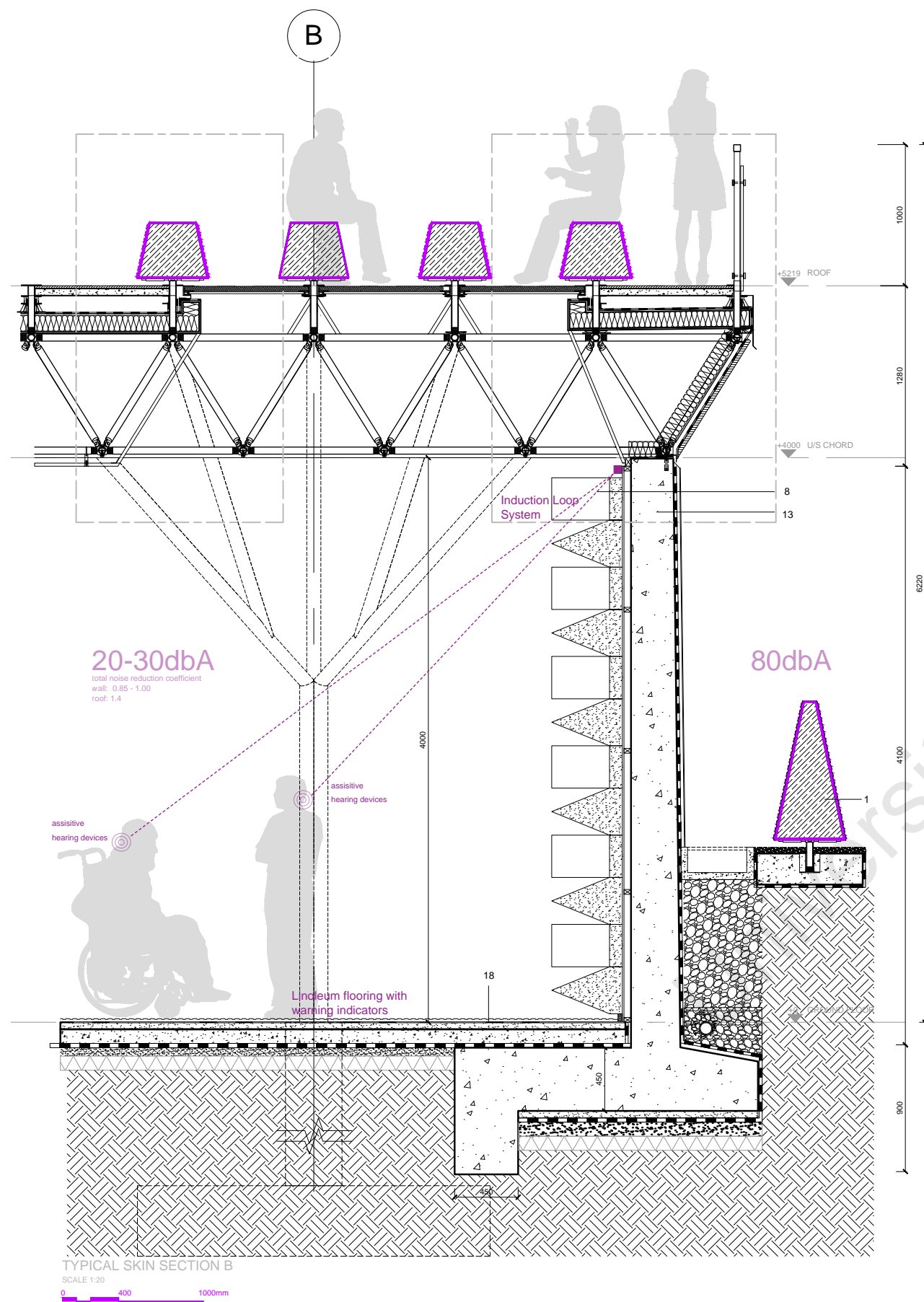
7.17. Logic of roof construction.



7.18.



7.19. Skin section with non-loadbearing wall.



CONCLUSION

"KNOW ME FOR MY ABILITIES, NOT MY DISABILITY." ROBERT M. HENSEL.

The design dissertation "Inclusive and Rehabilitative Environment" focuses on challenging and changing the social-cultural attitudes and practices toward people with disabilities. It explored design ideas, spatial conditions and accessibility strategies that can be used to educate designers, decision-makers and the general public about disability issues, the need for human equity and dignity.

Robert M. Hensel, who has spinal bifida, always tells people, "Know me for my abilities, not my disability." This motivated me to design multi-sensory spaces and initiatives that promote understanding, respect and compassion toward people with disabilities. Visitors to the Extra-Sensory Expo will gain eye-opening experiences from voluntarily restricting their functional limitations and exposing themselves to the daily challenges faced by people with disabilities.

The design dissertation has exposed me to many disability issues, the philosophy of Universal Design and the use of assistive technologies. It provided me opportunities to meet inspiring people with disabilities and accessibility consultants in Cape Town. These people provided valuable information for my research and forced me to reflect on my own disability. On a personal level, I have struggled to accept my deafness for years and I found integration into mainstream society difficult. This design dissertation has positively helped me to be more accepting of my own disability by

focusing on improving my abilities and achievements.

My interactions with accessibility consultants and NGO organisations have revealed the demand for more knowledge and resources on Universal Design within the context of developing countries. Despite the legal framework and policies in place for people with disabilities, South Africans have a long way to go to be more accepting and supportive of people with disabilities beyond the provision of wheelchair access.

Lastly, the dissertation highlights the potential for further research in using design as an educational tool to promote inclusion and accessibility in the local built environment. The researches into Universal Design provides interesting possibilities for in-depth researches, such as designing and integrating assistive technologies in public buildings to interior design of institutional buildings to aid with rehabilitation process or to the health impact of design decisions on the building's users. Other possibilities are research into spatial programming and design of institutional buildings, such as special needs schools, mobility-training centres and rehabilitation centres.

APPENDIX I: INTERVIEW TRANSCRIPTS



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Interviewer: Hiten Bawa
Interviewee: Zelda Mycroft (Chaeli's mother)
Organisation: Chaeli's Campaign, Hope in Motion
Date & Time: 13 March 2013
Address: 18 Clum Rd, Plumstead



Questionnaire

1. What is your current position?

CEO and co-ordinator of Chaeli's Campaign. An NGO organisation aimed at mobilising the mind and bodies of children with disabilities and to normalise society through advocacy and education programmes and events.

2. Please provide a brief background on yourself or your organisation.

The Chaeli Campaign was founded on 6 August 2004 by five girls between the ages of 6 and 12. Chaeli Mycroft, her sister Erin, and life-long friends, Tarryn, Justine and Chelsea Terry started the Chaeli Campaign to raise R20 000.00 for Chaeli's motorised wheelchair. They managed to do this in 7 weeks by selling cards with Erin's and Chaeli's artwork on them and miniature pot plants.

Zelda Mycroft is Chaeli's mother and oversees the activities of the Chaeli Campaign

3. What are problems associated with a wheelchair user?

Chaeli gets a sense of independence and movement in a motorised wheelchair but the ergonomics is different from a standard wheelchair. All the wheelchairs manufactured have different seat heights and need a lot of adjustments to meet the individual user's needs. Postures and wheelchair ergonomics are important. There are different types of wheelchairs for different situations. You get a standard wheelchair, a motorised wheelchair, hand-powered wheelchair and cyclist wheelchair.

It is hard to keep mobility-impaired people active and to stay active. They need to build muscles for their backs and spines, therefore postures in a wheelchair or furniture are important for people with spinal bifida or cerebral palsy.

4. What spatial conditions do think are problematic for Chaeli or her assistant?

The design of a bathroom, especially paraplegic toilet, needs to take ergonomics into consideration. A toilet seat must be on the same level as a wheelchair to ease movement and transfer. This will aid in transferring a severely disabled person from a wheelchair to a toilet without breaking the back of assistant.

5. What are your views on "wheelchair-friendly" buildings and barrier-free buildings

It is a matter of perception of accessibility and how one defines the term 'accessibility'. A rule of thumb for accessibility is that a person must be able to enter a building through the front door, not through a passage,

garage, overhead, a window or side gate. Wheelchair-friendly buildings are not good enough, they have no impact on changing perceptions on accessibility. Human beings are human beings, you have to take different people into consideration.

A barrier-free building needs to have more pronounced and visible features that have an impact on the users. However, what works for specific groups of disabled people may not work for others and you need to find a common ground.

6. What are your views on rehabilitation centres or health-care facilities for the disabled?

Special need schools or institutions pander to disabled people rather than challenges or educating the able-bodied society. They hide the disabled, making them invisible to society. These schools cannot be regarded as inclusive and many disabled students want to be included and mix with able-bodied friends. They want to enjoy life and activities like able-bodied people.

7. Which buildings or places in Cape Town do you find that are easily accessible, comfortable and free of barriers/ discriminations?

There are no places in the city that are fully accessible. We have a lot to learn from international examples and inclusive attitude toward the disabled. One year we went to Sweden for the wheelchair ballroom competition and a hotel accommodated 215 wheelchairs users with no problems. The rooms are match-box sized, the bathrooms are accessible and there were no complaints from the guests.

8. Is there any place in the city that is important or desirable for you to visit regularly, but are unable to do so? Why that particular place? How would you make it more accessible to you?

Virgin Active gym and gymnasium. Cerebral palsy or physically disabled people need to exercise their muscles to improve their postures and health. They need the exercise equipment to be universal, accessible, within reach and a good understanding from the fitness trainers.

Chaeli wanted to go to Ratanga Junction with her friends but was denied entry to rides because of the attitude barriers towards people with disabilities. Ride operators said that she posed a safety hazard to other people and herself. There are some sections of the park that she wanted to enjoy but are inaccessible for her wheelchair.

UCT upper campus is not accessible for Chaeli as a student. She has to travel three times the distance of an average student. She struggles with the library facilities which have no considerations for someone in a wheelchair in terms of desk ergonomics, reaching for a keyboard or a printer.

9. What are the attitude barriers toward disabled people?

Disabled people have varying degrees of disability and often people assume disabled people don't have assistants or cannot assist themselves. It is only the severely disabled that are unable to do basic tasks that require an assistant or those that need someone to instruct them or look after their needs.

The underestimated factor in designing for disabled is how attitudes influence design decisions and outcomes. Too much emphasis and focus is on the end product rather than educating people and challenging attitudinal barriers. The question is how design can educate people; teach them about respect, human equity and dignity.

The most common word professionals or designers use is "sacrifice" from an administration and financial point of view. It creates an attitudinal barrier, a negative mind-set and it should not be encouraged at all. There should be no issues in providing accessibility and people should not view expenses or solutions as sacrifices.

Money or financial constraints is a barrier to accessibility and exercising one's rights. It is often brought up in the built environment as an excuse for cutting costs and disregarding accessibility rights. It also limits the prospect of a disabled person who want to access any building for any reasons.

10. How would you rearrange a spatial condition (be it a home or an office or a public place) to meet the needs as a disabled person?

I want my offices to have enough spaces for wheelchair movement, most of our patients and wheelchair-users are forced to enter through the garage because the passages are too narrow.

Lift dimensions must accommodate a wheelchair-user and an assistant. The lift buttons are too far when placed next to the doors/ in corners. These buttons should be placed in the middle of the car's side wall rather than next to the doors.

Doors design – fire door, safety mechanism, opening mechanism, round door-handles.

Bollards are an obstacle when placed in the middle of the pedestrian walkway or cycle paths and tactile tiles are uncomfortable for a wheelchair user. Maybe the height of the raised texture should be considered.

Wheelchair users say that tactile tiles interfere with smooth motion or give a feeling of going over cobblestones.

Buttons on robots are not always at a comfortable height.

11. What technological or assistive feature would you like to see being adopted or integrated into the architecture of a building?

A pressure pad or similar to open a door for a wheelchair user.

Door opening both ways, and an accepted standards for door handles and fire doors.

If there is a technology available to assist a disabled person, there must be a backup plan if the technology fails.

Consideration for steps and fire doors.

Chair lifts/ stairs shouldn't be a problem for anyone.

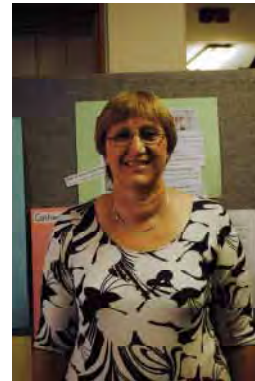
12. Which communities in the Cape Town metropolitan have a demand for rehabilitative facilities or social infrastructure for disabled people?

Middle class and wealthier suburbs are more likely to need such facilities as public opinions are formed in those areas. Poor society has an attitude problem and apathy about the issues around disabilities. It becomes more of a social problem than a lack of awareness. The poor need a lot of education to change their mind-set and they need to make an effort to seek help rather than wait for someone to help them.

There are disability rights but responsibilities are more important. Each person is responsible for his/ her life and need to move out of the comfort zones. An inclusive environment is only possible with the right people, right personalities and the right attitudes.



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Interviewer: Hiten Bawa
Interviewee: Ruth Bourne
Organisation: Carel du Toit School for Hard of Hearing children
Date & Time: 13 March 2013
Address: Tygerberg Hospital, Bellville

Questionnaire

1. What is your current position?

Principal of Carel du Toit School for Hard of Hearing Children.

2. Please provide a brief background on yourself or your organisation.

Carel du Toit School was built in 1973 with funding from the Apartheid government and the Tygerberg Hospital. The building was designed with the co-operation of acoustic engineers to respond to the need of hard-of-hearing children who relied on hearing aids to learn the oral language instead of sign language. Today the school accommodate 170 learners with hearing aids and cochlear implants from preschool to Grade 3.

3. What is the difference between Deaf, hard-of-hearing, Cochlear Implant user?

Deaf people are those who identify themselves with a capital D as if it were a culture. They believe in turning off your voice and their first language is Sign Language. They view cochlear implants as a threat to their culture. Those who are deaf, with a little d, are integrated with mainstream society with limited oral language. Hear-of-hearing people have varying degree of hearing loss and rely on hearing aids. Those with Cochlear Implants have a better hearing range than the hard-of-hearing people and rely on learning through listening and oral language without visual aids. This is called the auditory-verbal principle.

1 in a 1000 babies have profound hearing loss and 6 in a 1000 people have varying degree of hearing loss.

4. What are the limitations with regard to hearing loss and deafness?

The main barrier associated with deafness is communication and language. With assistive devices and therapies, these barriers can be overcome.

5. What spatial conditions do your students struggle with and why?

Acoustics is very important. Everyone, especially deaf people with assistive devices struggle in a building with poor acoustics, echoes, noises and reverberations. There are two directions of sounds and echoes interfere with hearing aids. It is difficult to communicate in that kind of environment.

6. Tell me about the school buildings.

The school buildings were not designed with the deaf children in mind. They were built by the government and given to us to start a crèche and preschool. The neighbouring building was built in 1994 but remained vacant for a number of years. We begged and begged for extra spaces to meet the growing population of learners

and eventually in 2006 the government gave approval for us to use the building. The sound quality of the old buildings was shocking. We realised how impossible the environment was for children with hearing aids and cochlear implants, and even for us with normal hearing. We have not employed any architects to make our school inclusive and we consulted acoustic engineers to improve the poor acoustic quality of the old buildings that we are trying to expand into. The acoustic engineers have installed suspended ceiling panels with acoustic tiles and recommended curtains, fabric and carpets to absorb sounds. They even installed a silent air-conditioning system in the classrooms. We figured out what features are desirable for the rest of the building. We would have consulted an architect if there was one with an expertise in inclusive design and acoustic consideration.

7. How do the assistive device operate?

The FM system have a 10m radius indoor for communication and a 30-40m radius for outdoor communication. One disadvantage is that the teachers have to remember to switch off the microphones to prevent eavesdropping on the learners part.

8. What technological or assistive feature would you like to see being adopted or integrated into the architecture of a building?

This is a regular building and we do not have any technological features or assistive devices for our learners. We rely on carpets, acoustic ceiling panels, wooden ceiling boards, silent air-conditioning system, curtains and fabric in the classroom to create an environment for our learners. We don't use the available assistive devices for the deaf because we teach our children learning through listening.

9. What kind of spaces or architectural feature that you think will benefit people with hearing loss?

Lot of light for visual clarity and a reduction of noises by using carpets and sound-absorbing materials, fabrics such as curtains. Thick windows for sound-proofing.

10. What kind of spaces affect hearing negatively and why?

Bathrooms have poor acoustic quality because of the tiles and smooth surfaces which create echoes.

11. Can a building with inclusive design features assist or challenge disabled people with their learning and personal development?

Most of our children with hearing loss are born in families with no hearing loss and therefore are brought up in a mainstream society rather than in Deaf culture. They are fully integrated with mainstream society because they learn the oral language as their first language as opposed to sign language as the "mother tongue" in deaf families.



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Interviewer: Hiten Bawa

Interviewee: 1

Organisation: Chaeli Campaign

Date & Time: 15 March 2013

Address: 18 Culm Rd, Plumstead

Questionnaire

1. What is your current position?

Unemployed.

2. Please provide a brief background on yourself.

Matriculated in 2012. 18 years old and still looking for a job. I live in Marina Da Gama in Muizenberg and attend the art workshop every Friday at Chaeli's Cottage. All my friends at the art workshop are perfectly normal though each of them have their own difficulties.

3. What is your disability?

Learning difficulties.

4. What spatial conditions do you struggle with?

Crowded places.

5. Which buildings or places in Cape Town do you find that are easily accessible, comfortable and free of barriers/ discriminations? Or which places do you like?

Shopping malls. Nice things to look at and buy.

The V&A Waterfront, Two Ocean Aquarium, Ratanga Junction and public places like Muizenberg beaches.

6. How easily do you travel to your destination of choice, whether using a private vehicle or public transport?

I travels with my family.

7. Is there any place in the city that is important or desirable for you to visit regularly, but are unable to do so? Why that particular place? How would you make it more accessible to you?

None.

(Interviewee 1 appears to be normal and less likely to be discriminated at in public places. However, her learning disability become obvious in situations associated with reading or writing.)

8. What kind of spaces affect you negatively and why?

Lights can be too bright. I like spaces with softer hues than bright colours.



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Interviewer: Hiten Bawa

Interviewee: 2

Organisation: Cape Town Society for the Blind

Date & Time: 19 March 2013

Address: 45 Salt River Road, Salt River.

Questionnaire

1. What is your current position?

I am attending computer training at the CTSB learning International Computer Driving Licence.

2. Please provide a brief background on yourself.

I am 52 years old and I live with 3 grown up children in Mitchell's Plain. I am a therapist by profession providing counselling services.

3. Can you tell me what is wrong with society?

I use public transport and I haven't tried the MyCiti bus system as I am using the Golden Arrow buses from Mitchell's Plain. There are no announcements on the bus, no designated bus-stops and no fixed routes. The Golden Arrow bus drivers have no considerations on where to stop and allow a blind person to get off safely. Most of the times the buses don't stop next to the pavement and I can trip over the kerbs. The drivers would not stop at the same place or street that I want to get to and I would get disorientated when I get off elsewhere. So I have learnt to catch the bus with the same bus driver that I know, I have spoken to the bus driver who is kind to enough to make sure I get off at an agreed place safely and close to the pavement. I would ask a passenger nicely to allow me to sit at the front because I am blind. Society needs to be considerate towards disabled people.

4. What caused your disability? Is it by birth or medical condition or by events?

My disability is caused by medical condition called Glaucoma. The loss of sight was progressive over 20 years and I lost my vision in 2010. I can still see light and dark, I can see colours depending on how close the object is to my eyes. My experiences as a sighted person helped me with adjusting to life without sight as I know what things look like. My sense of hearing and touch are heightened to compensate for lack of sight.

5. Do you use assistive devices or technology in your daily life? Why do you use them and how do they assist you to overcome your challenges?

I rely on my cane to help me around. I don't use any other devices and I don't know what is available for the blind. I am learning International Computer Driving Licence to help me use a computer, it uses a function called text-to-speech in which the computer read out the words on the screen or as you type along.

6. Where do you reside in Cape Town? Is your place of residence adapted to meet your needs as a disabled person?

I know my home very well. I have a memory of furniture arrangements and nothing has changed since I lost my vision.

7. What is it about the local environment or spatial conditions that you struggle with and why?

I am still adjusting to life since losing my vision three years ago. I am learning orientation with my cane and I found entering a building a challenge. I prefer buildings that you can enter easily from the street and from the front.

Sloping ground or ramps mean danger as they stand out or are too steep. It would be helpful if ramps came with handrails or a guide to prevent slips.

I don't like smooth, slippery floors. The acoustic of some buildings can be confusing and I rely on sounds to help with orientation.

Public paraplegic toilets can be confusing; it would be good if it was redesigned with more standards and features to help knowing where the basin, the toilet and the hand-dryer are.

8. Which buildings or places in Cape Town do you find easily accessible, comfortable and free of barriers/ discriminations?

Century City is found to be easily accessible because the disabled parking bays are close to the entrances. I usually rely on a sight-guide to help me around inside the building, a sight-guide could be a family member or strangers that I ask for assistance.

The Promenade Mall is another place that I found easily accessible because the entrance is at street level.

9. Is there any place in the city that is important or desirable for you to visit regularly, but are unable to do so? Why that particular place? How would you make it more accessible to you?

I am not comfortable yet with venturing out on my own. Coming to the CTSB was the first step in building confidence. I would love to go to gardens, libraries, museum and galleries. I want to visit the District 6 museum if only they have audio guides. The libraries unfortunately have printed books and it will be nice if they have audio books, text-to-speech programs on their computers or personal assistants for the visually impaired.

All the robots need to be adjusted to give sound signals. Sound announcements at the entrances to important places and buildings will be helpful for me to know where I am going.

I avoid the train stations and taxi ranks because they are very confusing for me.

10. What technology or assistive feature would you like to see being adopted or integrated into the architecture of a building? Please explain your answers.

I don't know what are tactile tiles are because there are no such tiles in Mitchell's Plain. It would be lovely if someone introduced me to tactile tiles and how to use them. It would be lovely to have such tiles to guide me around inside buildings and take me to the reception from the entrance.



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Interviewer: Hiten Bawa

Interviewee: 3

Organisation: Chaeli Campaign

Date & Time: 15 March 2013

Address: 18 Culm Rd, Plumstead

Questionnaire

1. What is your current position?

Employed full-time at Chaeli's Cottage for over a year with kitchen duties.

2. Please provide a brief background on yourself.

I am 28 years old and I live in Diep River with my mother and a sister. I like movies, romantic and comedy types.

3. What is your disability?

Learning difficulties

4. What spatial conditions do you struggle with?

Crowded places.

5. Which buildings or places in Cape Town do you find that are easily accessible, comfortable and free of barriers/ discriminations? Or which places do you like?

Shopping malls. Nice things to look at and buy.

The V&A Waterfront for entertainment and shows. Two Ocean Aquarium, and churches.

6. How easily do you travel to your destination of choice, whether using a private vehicle or public transport?

I take 20-30min walk from Diep River to Plumstead daily. I travels with my family members in a private car and I don't like public transport.

7. Is there any place in the city that is important or desirable for you to visit regularly, but are unable to do so? Why that particular place? How would you make it more accessible to you?

Cape Town city centre. I don't visit the city centre alone because it is not safe for me. I rather go in the company of my family members. I can get lost easily that is why I am scared of being alone.

Century City and Ratanga Junction are too far for me and too crowded. Wynberg Park is also crowded.



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Interviewer: Hiten Bawa

Interviewee: 4

Organisation: Cape Town Society for the Blind

Date & Time: 19 March 2013

Address: 45 Salt River Road, Salt River.

Questionnaire

1. What is your current position?

I am a trainer at the CTSB since 2010 learning cane-weaving.

2. Please provide a brief background on yourself.

I am 33 years old and I live in Gugulethu with my family. I became totally blind from tuberculosis in 2010. It was a difficult time for me to deal with sight loss but I have learnt to accept my disability. I travel mostly by taxis and I am quite independent.

3. What caused your disability? Is it by birth or medical condition or by events?

Tuberculosis.

4. Do you use assistive devices or technology in your daily life? Why do you use them and how do they assist you to overcome your challenges?

I don't use assistive devices beside my white cane.

5. Can you tell me what is wrong with society?

People in the township take advantage of me when I ask for assistance. They want to be paid for helping a blind person around, and if I don't give them money then they won't help me next time they see me. It is like bribing someone to help you.

6. What is it about the local environment or spatial conditions that you struggle with and why?

I have difficulties with orientation in stations and taxi ranks because these places are crowded. Shopping malls and open spaces are other spaces. I found it impossible to find products and food on the shelves so I need to go with a friend or family member when shopping. My hearing sense is heightened to compensate my sight loss and help with orientation.

7. Which buildings or places in Cape Town do you find easily accessible, comfortable and free of barriers/ discriminations?

I avoid the city centre because I can get lost easily and I get pushed around by people and crowds. I don't go to town as often as I would like to.

8. Is there any place in the city that is important or desirable for you to visit regularly, but are unable to do so? Why that particular place? How would you make it more accessible to you?

I would like the hospitals and banks to be more accessible. I don't like to go to hospitals but I am forced to do so.

9. When you think about going somewhere. What are the primary things that concern you and how do you think they can be improved in order to make your experience of moving around and living in Cape Town easier?

In the township it is impossible to find my way around, there are no pavements, no proper lighting, and I have to ask for directions or someone to guide me. I would like to have a guide dog to help with navigation but it is not easy to keep one in the township. Then there are costs involved like grooming, feeding and veterinary services to worry about.

10. What technology or assistive feature would you like to see being adopted or integrated into the architecture of a building? Please explain your answers.

I am still learning how to cope with blindness so I am not sure about technology. I am learning mobility and orientation, it takes time to adjust. I don't know what a tactile tile is because there isn't such thing in the townships.

11. Is there anything else do you want to share with me?

I enjoy cane-weaving as it keeps me busy. I learnt to follow the patterns and texture of cane weaving by touch and memory.



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Interviewer: Hiten Bawa

Interviewee: 5

Organisation: Chaeli Campaign

Date & Time: 15 March 2013

Address: 18 Culm Rd, Plumstead

Questionnaire

1. What is your current position?

Part time employee of Chaeli Campaign.

2. Please provide a brief background on yourself or your organisation.

I am 37 years old. I live in Fish Hoek with my mother.

I work 3 days a week here at Chaeli Campaign helping with kitchen duties and administration. I work one or two days in Fish Hoek for a family friend.

3. What is your disability?

I don't know exactly, but people tell me I have Asperger Syndrome.

(Interviewee 5 has a heightened ability to draw according to her occupational therapist.)

4. What spatial conditions do you struggle with?

Crowded places. I can't understand or read maps so I can't help you with mapping.

5. Which buildings or places in Cape Town do you find that are easily accessible, comfortable and free of barriers/ discriminations?

I like Cape Town for its relaxed lifestyle but I am not keen for outdoor activities. I go to Kalk Bay hospital, Fish Hoek Library or volunteer at Cares looking after animals.

6. How easily do you travel to your destination of choice, whether using a private vehicle or public transport?

I rely on train to travel from Fish Hoek to Plumstead. Besides that, I don't travel much.

7. Is there any place in the city that is important or desirable for you to visit regularly, but are unable to do so? Why that particular place? How would you make it more accessible to you?

Cape Town city centre is too far. I don't visit the city centre, in fact I have never been there.

I like to go to movies but I can't because my ears are too sensitive to handle the volume of the sound. I don't like shopping malls because they overload my senses.

My mother tried to take me to places in the beginning, but she doesn't force me anymore.

8. What kind of spaces affect you negatively and why?

Crowded public spaces. They expose me to social exclusion, prejudices and discrimination because people don't understand me. They make fun of me at my expense.



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Interviewer: Hiten Bawa

Interviewee: 6

Organisation: Planet Kids

Date & Time: 16 March 2013

Address: 6 Wherry Road, Muizenberg, Cape Town

Questionnaire

1. What is your current position?

Director of Planet Kid, an indoor playground and activity centre.

2. Please provide a brief background on yourself or your organisation.

Planet Kid is the only inclusive, indoor playground in Cape Town catering for abled-bodied kids and disabled kids. It is a venue for parties, social events, dating for single parents and an odd class or two. All the play equipment is custom-designed and eco-friendly. We get very busy during the rainy season.

I am an occupational therapist by profession but I now I am managing my own business. I am originally from Germany, I married a South African and we have a 15 years old son, who has severe autism and epilepsy. That's how we came to start an inclusive Indoor Play and Activity Centre. That means we're trying to accommodate all children, including children with disabilities. Luca's classroom is included at Planet Kids as he is home-schooled and none of the special needs school want to admit him.

Most of the children (living with a disability) who come and visit us are on the autistic spectrum. Anyway we're trying to accommodate as many as different disabilities as we can. But then again, everyone is different. Part of the problem we experienced as parents in our society/community is that there are not so many places where one can actually meet people who are different (and that it's ok to be different). Therefore we thought that's what we need to establish. However it's still a struggle to get all the parents and caregivers out from their protective home or institutional environment. We never had the chance to stay home since our son has always been very active.

About the building: we brought the Jewish community hall which was built in 1933 and converted it into an indoor playground centre. We tried to adapt the interiors as we go and design our own play equipment since it is expensive to import specialised equipment. We are not perfect, there are no paraplegic toilets though we have a temporary ramp at the entrance.

3. What spatial conditions do you struggle with?

Below are selected excerpts from the audio recording of the interview:

The acoustics is very poor inside, it gets very noisy with all the kids playing. The flooring needs some attention to prevent injury from falls and accident. We don't have a paraplegic toilet and we would like to install one if

My idea is to let children play, even children in wheelchairs. Can you imagine a child sitting in a wheelchair the whole day?

I have designed and created an inclusive swing, it has a circular, cushioned seat with organic ropes. This makes it easier to transfer a disabled child from a wheelchair to the seat. You can swing it in all direction and spin it around. Any kid can use it and I know when it works for a disabled kid after seeing a smile on the kid's face. The timber is free of CCA (Chromated Copper Arsenate) and we do not use metals which can corrode and be harmful for any kid who touches or licks it. We used non-harmful paints for all paintwork.

We don't have many assistive devices in our building. However, we go out of our way to make every kid feel special. The swing and the body boards is one type of play equipment that we found to be enjoyed by disabled children. It even brings a smile to those who have cerebral palsy.

We provide sugar-free food because too much sugar can make kids hyperactive.

It is very difficult to encourage disabled people and parents of disabled kids to come out of their comfort zones and take part in mainstream society because of fears of discrimination, social exclusion and embarrassment. Many of them stayed at home or had to look after their children constantly with no inclusive place to go in mind. We want to change that mind-set and show people that it is ok to be different and allow disabled children to integrate with mainstream society. Changing attitudes is important so people don't necessarily get offended by any unintentional actions from a child with disabilities.

My son likes pressures, to stamp his foot or hit a surface with his hand. It calms him down. He likes sand and stones which he throws. The action is what he enjoys and helps calm him down. When he gets upset, he goes into an epileptic fit.

When you meet people at socials, often they mention in conversations that they know someone who is disabled, a friend's friend, a colleague, a classmate or a family member but you don't meet the actual disabled person. It is always being referred to as if the person should be hidden and invisible.

Exposure to someone with disability will help educate people to be more understanding and tolerant. It will come as a shock, a bit uncomfortable, but then they will realise that disabled people are normal.

We found the swing to be effective in making a disabled child smile, especially those with limited communication.

I don't know any other places in Cape Town that are inclusive and accessible. Partly because of my son's condition we don't visit a lot of places in Cape Town and he gets restless when we are in a crowded space. When parents want to go out, they either leave a disabled child at home with a care-giver or with a family member so that they can avoid attracting attention or having to be overprotective when faced with societal attitudes.

We want toy shops and pharmacies to be more sensitive to kids without overloading their senses and have public toilet available for people who can't handle their bowels, especially disabled kids. People have to be more accommodating if they want us as their client to come back.

Any play equipment can be therapeutic and help with the rehabilitation of a disabled child. One day I discovered that a paraplegic child figured out the purpose of the body board without anyone telling him and used it to move around the hall and up the ramps without any assistance other than using the limited movements of his limbs. It is wonderful but it also brings a smile to his face.



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Interviewer: Hiten Bawa

Interviewee: 7

Organisation: Cape Town Society for the Blind

Date & Time: 19 March 2013

Address: 45 Salt River Road, Salt River.

Questionnaire

1. What is your current position?

I have been training at the CTSB since 2007. I am employed with cane-weaving and making household objects.

2. Please provide a brief background on yourself.

I am 26 years old and I live in a shack in Langa East. I am partially sighted though I can read and write. I was training to be a teacher at a college before I was disabled. Now I am employed with cane-weaving and making objects.

3. What caused your disability? Is it by birth or medical condition or by events?

My disability is a result of robbery in the township on Saturday afternoon in 2007 when I was shot in the head. The bullet damaged my optical nerves. It was difficult for me to adjust to my disability and I am still staying with the same people who shot me.

4. Do you use assistive devices or technology in your daily life? Why do you use them and how do they assist you to overcome your challenges?

None, beside a cane.

5. What is it about the local environment or spatial conditions that you struggle with and why?

I ask for assistance when I need to go to the bank and shopping. I can't do something simple like using an ATM alone. I have problems with orientation and mobility. The city centre is confusing for me and I can't go alone.

6. Which buildings or places in Cape Town do you find easily accessible, comfortable and free of barriers/ discriminations?

None. I agree with Interviewee 4 about visiting the city centre.

7. Is there any place in the city that is important or desirable for you to visit regularly, but are unable to

The city centre is one place. I was training to be a teacher and I want to see the private colleges and workshops to be accessible. The name of the building and signage should be clear for a partially sighted person. Small lettering doesn't help at all.

8. When you think about going somewhere. What are the primary things that concern you and how do you think they can be improved in order to make your experience of moving around and living in Cape Town easier?

I am still learning to adjust to going out of my comfort zone. I like to have a computer and a cellphone to be more mobile. It is a good idea to have all the computers fitted with text-to-speech software like the touch-screen maps in the shopping malls.

9. What technology or assistive feature would you like to see being adopted or integrated into the architecture of a building? Please explain your answers.

I don't know what a tactile tile is because that is new to me. The tiles you see at the new bus stations are not easy for me to understand. It will be nice if I get to know how it works and it will be nice to have them in a building together with Braille signage. The signage should be on the door and with raised letters.

10. Is there anything else do you want to share with me?

Acoustics is very important for me and Godfrey, our hearing is heightened and sounds can help us with way-finding and identification of places.



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Interviewer: Hiten Bawa
Interviewee: 8
Organisation: Chaeli Campaign
Date & Time: 15 March 2013
Address: 18 Culm Rd, Plumstead

Questionnaire

1. What is your current position?

Employed part-time at Chaeli's Cottage for over a year with kitchen duties. I work on Thursday and Fridays. I help other people whenever they ask me.

2. Please provide a brief background on yourself.

I am 25 years old and I live in Constantia with my parents. I like movies, music and embroidery.

3. What is your disability?

Down Syndrome. I have problems with speech and stutter.

4. What spatial conditions do you struggle with?

Way-finding and orientation.

5. Which buildings or places in Cape Town do you find that are easily accessible, comfortable and free of barriers/ discriminations? Or which places do you like?

Blue Route shopping mall. The V&A Waterfront and Muizenberg beaches. I like colourful places like Muizenberg beach huts.

6. How easily do you travel to your destination of choice, whether using a private vehicle or public transport?

I don't mind going everywhere but I never go alone because I can get lost. I travels with my family members and friends in a private car.

7. Is there any place in the city that is important or desirable for you to visit regularly, but are unable to do so? Why that particular place? How would you make it more accessible to you?

I don't mind going anywhere. (Interviewee 8 is immune to discrimination, she has the appearance of a child but is a fully-grown woman of 25 years old).

I want to visit places overseas or outside of Cape Town but I can't afford it and my family worries about my safety and security.



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Interviewer: Hiten Bawa
Interviewee: Vincent Daniels
Organisation: Cape Town Society for the Blind
Date & Time: 19 March 2013
Address: 45 Salt River Road, Salt River.

Questionnaire

1. What is your current position?

I am a Public Awareness Officer at the CTSB and I am involved with training, development and teaching blind people the techniques of orientation and mobility with and without a cane.

2. Please provide a brief background on yourself or your organisation.

I am 57 years old and I became progressively blind since 1981. I could see when I was a teenager except night vision, so I knew what the world looks like before I lost my sight. I am legally a blind person.

3. What caused your disability? Is it by birth or medical condition or as a consequence of action?

I lost my sight progressively due to a medical condition called Retina Pigmentosa. I cannot see very well but I can perceive light and dark. The condition meant that I could not see night visions. The second condition is Usher Syndrome which causes hearing loss and that is why I don't like noisy environment. People assumed that blind people have superior hearing because they cannot see, but that is not the case with me. I have a good experience of what it is like to see or experience things and this helps me to adjust to my sight and hearing loss. Sight loss affects the way a blind person experiences spaces, shapes and things.

4. Do you use assistive devices or technology in your daily life? Why do you use them and how do they assist you to overcome your limitations?

Objects should be functional and useful for blind people. Take a kettle for example, in the old days you could get a kettle pot with a long pronounced spout that make it easier to pour hot water into the cup. You can feel the spout with your fingers and place it on the edge of the cup. The spout does not slip and spill hot water. Nowadays you can't find a kettle like that! All the modern kettles have thin lips with no edges which is difficult to place on the cup edge without slipping. When pouring hot water, we use our fingers to feel the steam rising until it is close to our fingers. The other trick is touching the side of the cup which is cold and feeling for the heat to determine the level of hot water being poured in. These are the kind of considerations we would like to see in everyday objects.

I rely on some general rules or standards, say when I enter room I know there might be a window somewhere in the space that can help with orientation. But that is not always the case in some buildings. That window lets in light and heat and I can perceive it with my limited vision, and use the light for orientation. Besides that, I use a white cane to find my way around outside of the CTSB environment with which I am familiar. I don't use modern assistive devices and I use text to speech software on a computer.



5. Can you tell me what is wrong with society?

I usually ask for assistance when I go alone to places like a shopping mall. Say I want to go to Clicks, I will ask a stranger to help me and I prefer to be given clear directions on how to get there. If the place is too far then I will ask to be taken to the entrance of the shop. It depends on how well you are able to ask a total stranger for assistance. People are willing to help me and very few will ignore me. There are people you may find that are too over-eager to help a blind person when they see one. These people can be annoying when you don't need help and should enquire first whether a blind person needs help or not before going into overkill.

6. What is it about the local environment or spatial conditions that you struggle with and why?

I cannot cope in noisy environments with my poor hearing and I like to be in places which are quieter and easy to have conversations.

7. Which buildings or places in Cape Town do you find easily accessible, comfortable and free of barriers/ discriminations?

I think whatever that is being designed specifically for the blind may not work for other disabled people. One has to be practical with the signage, tactile tiles, announcements and visibility. The MyCiti bus stations are very reliable and are good examples of accessibility for the disabled people.

8. Is there any place in the city that is important or desirable for you to visit regularly, but are unable to do so? Why that particular place? How would you make it more accessible to you?

The area between the Cape Town train station and the Civic Centre bus stations is very inaccessible because there are too many obstacles in the way. A normal person won't have a problem getting from the train station to the civic centre, but it is a very confusing environment for a blind or visually impaired person with all the barriers. The entrance on one side of the train station opens onto the parking area rather than lead straight to the civic centre. There is no shortcut for a blind person and you have to consider how a blind person can physically move from the train to the bus.

The space inside the Cape Town station is huge and wide for a blind and visually impaired person to get lost in. The building acoustics is very poor when hearing announcements. The platforms are long and there is no way a blind person can find the carriage doors to get in the train. How often does anyone slip on those ugly, slippery tiles on the platforms especially when the tiles get wet?

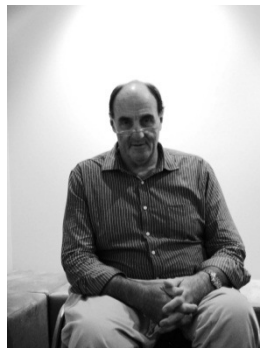
The intermodal system is lacking in the MyCiti bus system. It will be nice to have intermodalism in the public transport system where a blind person can move seamlessly from the train to the bus to the taxi. I want the taxi ranks or transport interchanges to have the same standards as the MyCiti Bus Stations in term of accessibility. These spaces must be more predictable and fixed to aid with memory.

9. When you think about going somewhere. What are the primary things that concern you and how do you think they can be improved in order to make your experience of moving around and living in Cape Town easier?

I grab my long white cane and I think about the safety of the routes that I plan to travel. It is difficult to travel outdoors because of the many obstacles to deal with like the refuse and dirt. It will be much easier if the city was cleaner so I don't have to walk through all the pollution.



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Interviewer: Hiten Bawa

Interviewee: Phillip Allan Thompson

Organisation: IDC Consultants

Date & Time: 27 March 2013

Address: 21 Sunclare Building, Dreyer Street, Claremont

Questionnaire

1. What is your current position?

I am the managing director of the IDC Consultants working on architecture, urban design and universal design.

2. Please provide a brief background on yourself.

I am an architect and a consultant on Universal Design. My disability motivated me to specialise in Universal Design and push for change in the local building regulations. There is not enough work being done to address the issue of accessibility in this country.

3. Can you tell me what is wrong with society?

UCT school of architecture has the habit of discouraging students from looking in the direction of provisions for people with disabilities, they tend to ignore Universal Design rather than make it an integral part of architectural knowledge.

4. What caused your disability? Is it by birth or medical condition or by events?

I was involved in a helicopter accident a few years ago which damaged my spinal cord and rendered me a paraplegic.

5. Do you use assistive devices or technology in your daily life? Why do you use them and how do they assist you to overcome your challenges?

I am a wheelchair user and I don't use any other assistive devices in my daily life. I make a few adjustments with furniture to accommodate a wheelchair.

6. Which buildings or places in Cape Town do you find easily accessible, comfortable and free of barriers/ discriminations?

There are very few places in town that I find are accessible, and places that I usually frequent before I became a paraplegic are now inaccessible for a wheelchair user.

7. Is there any place in the city that is important or desirable for you to visit regularly, but are unable to do so? Why that particular place? How would you make it more accessible to you?



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Interviewer: Hiten Bawa
Interviewee: Guy Robert Davies
Organisation: Disability Solutions
Date & Time: 28 March 2013
Address: Civic Centre

Questionnaire

1. What is your current position?

I am a consultant on Universal Design mostly dealing with the transportation sector. My job is to make sure the public transport is inclusive and accessible.

2. Please provide a brief background on yourself.

I am originally from the UK and I moved to South Africa in 1995. I am one of three independent consultants in this country dealing with Universal Design and there is a lot of work to do in this country compared to the UK which has hundreds of consultants. At the moment I am busy with a Phd on Inclusive Design looking specifically at transportation issues. I have worked on the MyCiti Bus system and other BRT projects in other cities.

3. Can you tell me what is wrong with society?

Most blind people in this country do not know what tactile tiles are and this is because they are not familiar with the technology and have not been educated about their purpose. We need to educate disabled people on what is available in today's world that they can benefit from. Universal design shouldn't be specialised or have a separate regulations, it should be integrated seamlessly with mainstream knowledge and building regulations.

Societal attitude is a big problem in this country and people need to be sensitised toward the disabled. I went to P.E. to assess the Nelson Mandela Stadium's accessibility for the 2010 World Cup. While I was at the turnstile gate the security guard called me a cripple and requested me to walk through a gate while he hurl the wheelchair through another entrance. I told him that was unacceptable, I can't walk and there is a wider entrance that he should open to allow a wheelchair user entry. Can you believe that?

4. What caused your disability? Is it by birth or medical condition or by events?

I had a spinal injury from playing rugby many years ago and I had not treated it properly. The injury caught up with me and left me a paraplegic from the waist down.

5. Do you use assistive devices or technology in your daily life? Why do you use them and how do they assist you to overcome your challenges?

I am a wheelchair user. I drive a car which is adapted to be controlled with my hands and I am quite independent when it comes to travelling.

I feel the Fringe precinct is an inaccessible place now and is still yet to be developed as part of the city urban design framework. All the buildings are old and are not refurbished to meet the accessibility requirements of today's times.

The Cape Town Railway station is another inaccessible place for many disabled people. the design of the building did not take into consideration integration of all the accessibility features. The technology in place is incomplete. The acoustics is poor and the tiles are slippery.

The Cape Town Stadium is also acoustically poor no matter how much the acoustic engineers tried to improve the situation. The shape of the stadium bowl, the material of the roof and the seating all contribute to the acoustic quality and one can hear reverberation around the stadium.

8. What technology or assistive feature would you like to see being adopted or integrated into the architecture of a building? Please explain your answers.

There are many assistive devices out there for disabled people. I would prefer the design of a building to be universal and seamless as if it were designed for everyone rather than for a specific group of people.

6. What is it about the local environment or spatial conditions that you struggle with and why?
There are many issues that I can find in a building. My issue lies with physical mobility and ability to reach for things like a lift buttons.

7. Which buildings or places in Cape Town do you find easily accessible, comfortable and free of barriers/ discriminations?

The MyCiti bus stations are accessible because I have worked on the project. However the accessibility feature of the stations need to be extended into the surrounding context and to the rest of the city.

8. Is there any place in the city that is important or desirable for you to visit regularly, but are unable to do so? Why that particular place? How would you make it more accessible to you?

There are so many places that I can think of. Beside physically accessibility, societal attitude can make any place or building inaccessible. Cape Town Stadium is one of those places that lack proper way-finding feature and tactile tiles for the blind. Acoustics inside the stadium is another issue. The main train station is another place that is not fully accessible and lacking considerations.

9. What technology or assistive feature would you like to see being adopted or integrated into the architecture of a building? Please explain your answers.

I will like to see all the features that are designed for the disabled to blend in seamlessly with the building design. Cape Town has a long way to go to be an accessible and inclusive city if it want to be an example of a World Design Capital.

10. Is there anything else do you want to share with me?

Say a scenario, like a video, a wife asked a man to buy a white t-shirt. He goes out and walked down the street and came across a group of disabled people walking toward him staring and commenting about how normal he is and how brave is he to walk outside. Then he goes onto the bus which is designed for wheelchair users only and the driver tell him that he is not allowed onto the bus because only wheelchair users can get onto the bus. So he get off and goes into a normal shop. In the shop he asks the shop assistant for a white t-shirt but gets the response in sign language. Then the man finds it impossible to communicate and then walks out of the shop. He goes into the next shop that was too dark to see inside and asked a blind person where the white t-shirt is. The blind person said it is at the back. Now the man doesn't know what to do and then goes into the next shop and finds the ceiling is about a metre high with all the wheelchair users moving all over the space. Can you imagine him bending over to go under the low ceiling. Finally the man reached home and his wife asked him if he found a white t-shirt. He replied "you know what, I tried to find a white t-shirt but I just couldn't do it."



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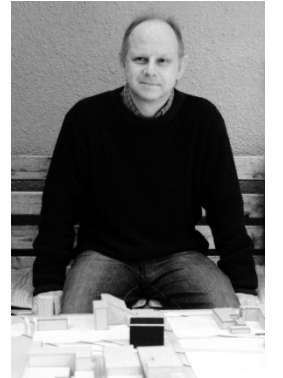
Interviewer: Hiten Bawa

Interviewee: Jeremy Opperman

Organisation: Independent Consultant

Date & Time: 8 May 2013

Address: Claremont, Cape Town.



Questionnaire

1. What is your current position?

I am an independent consultant on disability issues.

2. Please provide a brief background on yourself or your organisation.

I am a visually-impaired person. I work from home and my job is to advise people and organisations on a range of disability issues. Some of my clients are families of children with disabilities and other are social workers who need advices on working with people with disabilities.

3. What caused your disability? Is it by birth or medical condition or as a consequence of action?

I lost my sight for medical reasons. I cannot see very well but I can perceive light and dark.

4. Do you use assistive devices or technology in your daily life? Why do you use them and how do they assist you to overcome your limitations?

I do use a white cane and I rely on my guide dog for mobility. I am familiar with Cape Town CBD and I find it easy to get around. I finds the city blocks smaller, pedestrian-friendly and all the important places are within walking distance to each other compared to the places in the suburbs.

5. Can you tell me what is wrong with society?

People do not understand how to accept people with disabilities and how to include them in mainstream society. There are few accessible places in Cape Town. The reason many people with disabilities do not venture out to these places or the CBD is due to a lack of information accessibility. It will be beneficial if people advertise the places to improve awareness.

6. What is it about the local environment or spatial conditions that you struggle with and why?

I find the pedestrian streets and pavement littered with street furniture. Some of the street furniture are not fixed and they can be confusing. I found the audible traffic signals at the MyCiti bus station reliable. My issue is that all the traffic lights in Cape Town are not fitted with audible traffic signals.

I want the pavement to be wide enough for pedestrians and the built environment to be filled with sensory cues such as fountains, public sculpture and plants with strong scents.



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Date

Informed Consent for participation in Inclusive Design and accessibility for people with disabilities

My name is Hiten Bawa and I am currently doing Master of Architecture (Prof) at the University of Cape Town. The focus of my design dissertation is Inclusive Design and Accessible Architecture for disabled people. I am looking at the spatial challenges disabled people have with the built environment and how to address them through architectural design.

As part of my design research and requirements for the course, I want to engage people with disabilities using appropriate architectural research methodologies in the form of interviews, mappings and visual documentation. These research activities will enhance my understanding and analysis of the real challenges faced by disabled people, and investigates ways to overcome these barriers beyond wheelchair accessibility. The information will be used to develop an architectural intervention that is inclusive of anyone regardless of their abilities or disabilities which will be submitted to the course supervisors.

You are therefore requested to participate in this research voluntarily. Your identity will be published with your written consent in the design dissertation and you have the right to be anonymous or withhold confidential information at any stage of the research process. The interview will be recorded and the recording will be transcribed. You will be asked to check if the information is really what you said and corrections will be made where there would be misrepresentation of facts. You are free not to answer a particular question without giving explanation. Confidentiality will also be ensured by conducting the interview in an appropriate place agreed by both the student and the interviewee.

You will be asked to sign a consent form if you agree to participate in this research process. However, you may choose to withdraw participation without any penalty. This letter of consent, consent form and interview notes will be attached to the assignment, as proof of interview and ethical considerations.

The research will help the student to understand the spatial rights and needs of disabled people. Additionally, the interviewer gains in research skills during the whole process. Consequently, the student will be able to comprehensively approach disability issues in the built environment upon graduating. This understanding of disability is expected to empower people with disabilities considering all the interacting factors. Where there are questions regarding the process, the interviewee is allowed to ask before, during or after the process. If there is a need for referral identified by the student or interviewee, the same will be made to the relevant service providers.

Hiten Mohanal Bawa

M.Arch (Professional) candidate

University of Cape Town

(Cell): 083 3050 367 (SMS only, I'm deaf)

(Email): bwxhit001@myuct.ac.za

7. What other assistive technologies do you think is appropriate for the local context?

We live in the 21st century and there are clever devices and technologies that can benefit people with disabilities. There are devices with tactile maps that can be attached to a GPS system, or to a smartphone. There are Google Indoor maps with voice feedback that visually-impaired people can rely on. Unfortunately Google Indoor maps are not available in South Africa. Talking signage is a new concept. Basically it consists of a signage fitted with audio information that you can receive by pointing a remote control at it. The audio information can be the address, the name of building or company within the building.

Other technologies that are reliable in public buildings are audio-guides or audio-descriptions. The audio guide gives information on spatial layout, orientation and location of departments. Audio-description merely provides information on exhibits and point of interests.

I think whatever that is being designed specifically for the blind may not work for other disabled people. One has to be practical with the signage, tactile tiles, announcements and visibility. For example, only 10% of blind people use Braille and information in Braille are of no use. It is better to have raised texts at chest height on doors of rooms instead of Braille signage.

8. What is your opinion on Tactile Ground Surface Indicators?

I do not like the TGSi tiles because I find them confusing. These tiles are not applied properly in the local context compared to tactile tiles I came across in First World countries. There are international standards for the correct application of TGSi and these standards came from Australia and New Zealand.

I cannot tell the difference between the tiles and the surrounding paving if the tiles are made of concrete. Ideally, the tiles should be made of softer material like rubber or carpet so that visually impaired people can perceive the difference in texture. TGSi tiles should contrast with the surrounding to help with orientation. As an example, the tiles are black and the paving white, I can tell if the route of the tiles goes straight or change directions. Another aspect of the TGSi is the raised texture should be higher than the floor in order to be perceptible.

If you apply TGSi in your project, you need to think carefully about the spread of tiles and how they are used in conjunction with robots. I think it is a good idea to use landmarks and bus stations as points of reference.

APPENDIX III: FRINGE URBAN DESIGN FRAMEWORK

URBAN DESIGN FRAMEWORK

The Fringe Precinct was identified by the City of Cape Town for urban renewal and investments. The city council was intending to develop a design and media hub to accommodate the creative industries, designers, innovators and young entrepreneurs. A draft urban design framework was proposed for the Fringe Precinct in April 2012 by Guy Briggs in collaboration with other decision makers, industries and stakeholders. The framework aims to guide investment and design decisions of future developments in the area.

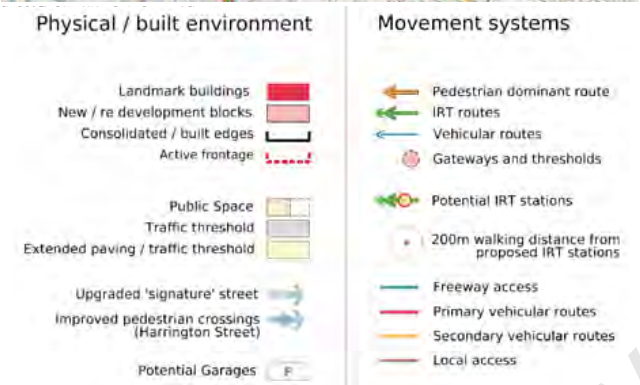
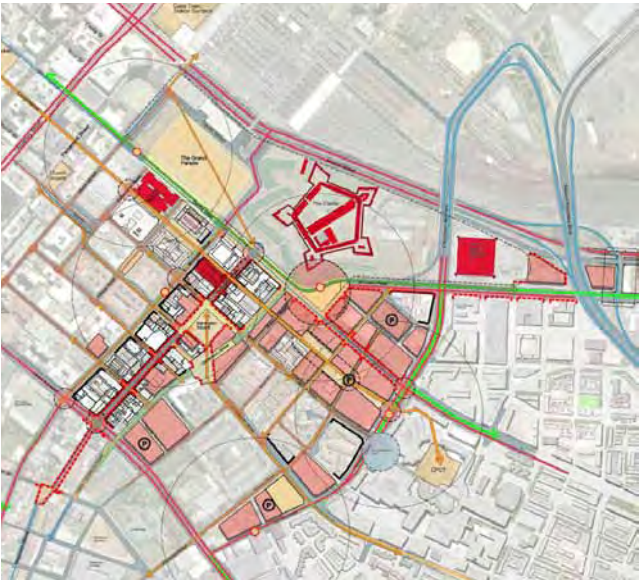
The draft document covered the urban, spatial and planning challenges and is thoroughly detailed with guidelines on improving the precinct. It attempted to address the human sensory needs subtly in the landscaping proposal. However, it lacks guidelines and strategies on accessibility that can aid in creating a humane and inclusive environment for everyone. Moreover, it did not provide guidelines on access to public buildings and integrating the accessibility features of the MyCiti bus stations into the surroundings.



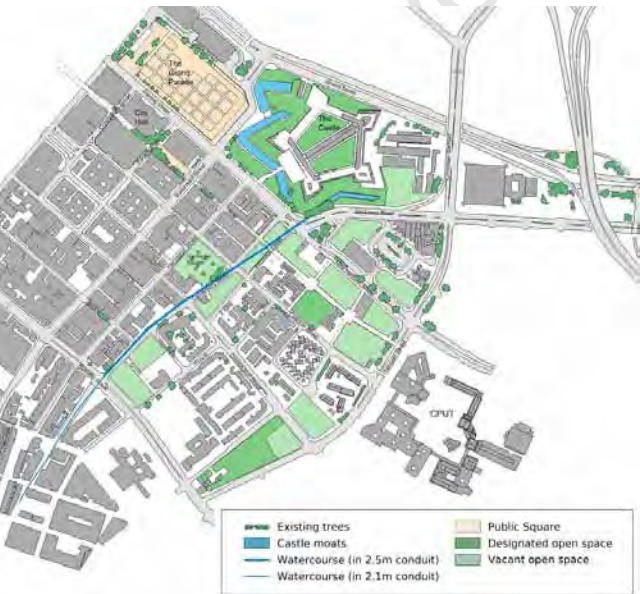
8.1. Guy Briggs.



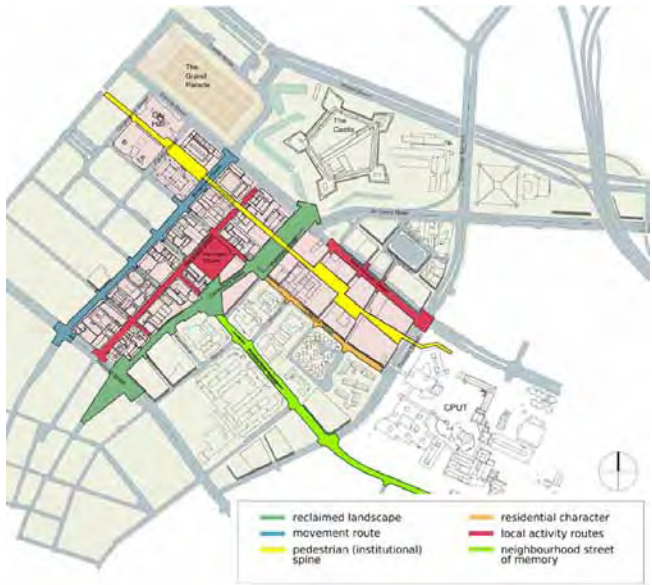
8.2. Vision for the Fringe Precinct and District Six (Briggs, 2012).



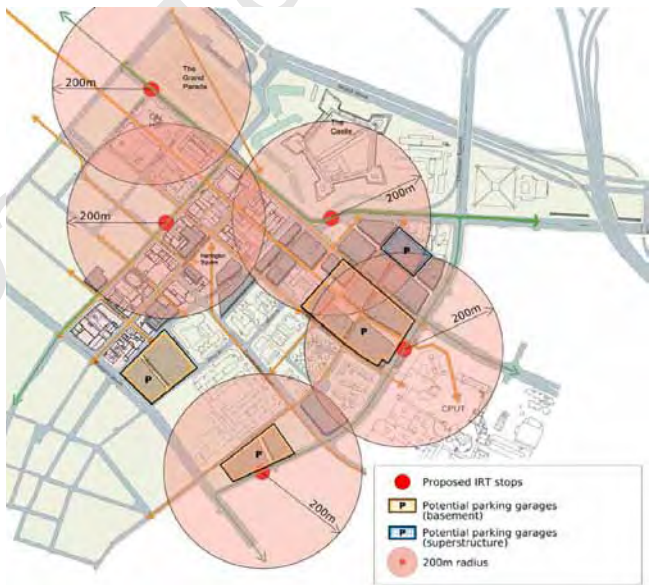
8.3. Draft urban design framework proposal (Briggs, 2012).



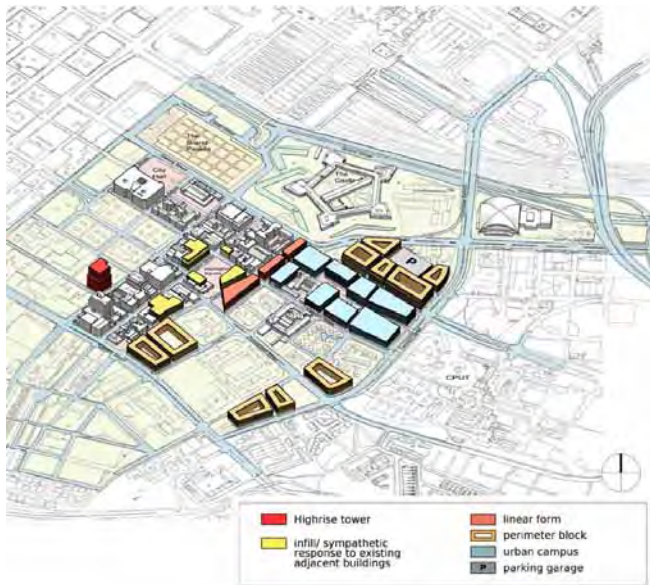
8.4. Hidden watercourse that flows under Canterbury St (Briggs, 2012).



8.5. Character streets with Canterbury St as a reclaimed landscape (Briggs, 2012).



8.7. Potential sites for public parking allows the site to be redevelop for other purposes (Briggs, 2012).



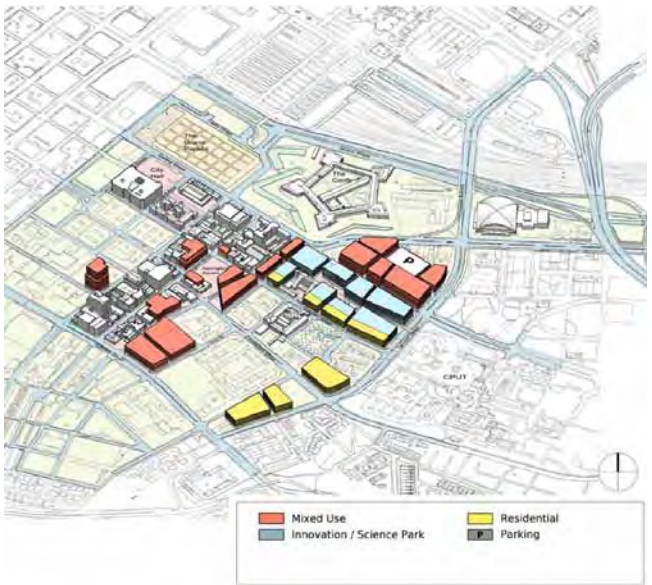
8.9. Building typologies for new developments (Briggs, 2012).



8.6. Major vehicular routes. The closure of reserve roads will not affect the traffic patterns (Briggs, 2012).



8.8. Landscaping proposal for the precinct (Briggs, 2012).



8.10. Zoning for new developments (Briggs, 2012).

BUITENKANT ST CASE STUDY

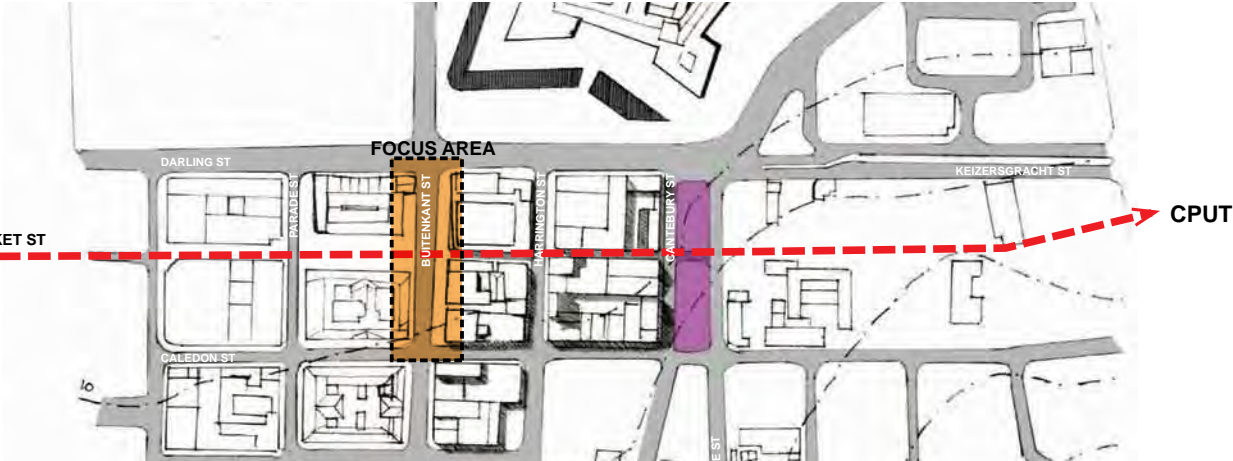
This section explores accessibility guidelines and strategies that can complement the draft Fringe Urban Design Framework. A section of lower Buitenkant St was chosen as a case study, because it contains a number of accessibility issues that need to be addressed.

Buitenkant St reflects the urban condition of the entire precinct. There are no drop- kerbs, no integrated TGSi with the new MyCiti bus stations, no audible traffic signals, narrow pavements with street furniture as obstacles and no consistent surfacing material to name a few.

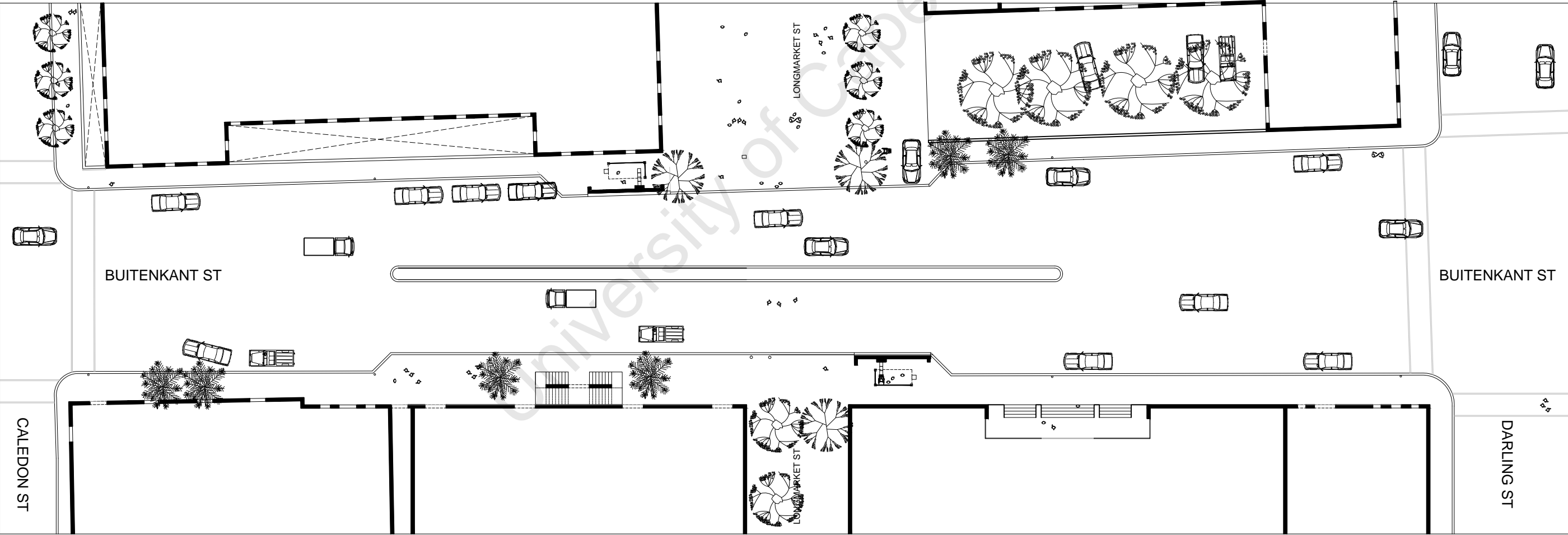
I explored how Buitenkant St can be improved with accessibility strategies developed from international examples and the National Building Regulation SANS 10400, Part S: Facilities for persons with disabilities. The lessons from the case study are applied in the design development of the Extra-Sensory Expo.



8.11. Google street view of lower Buitenkant St.



8.13. Lower Buitenkant street as case study example.



8.12. Existing conditions of Lower Buitenkant street.

ACCESSIBILITY GUIDELINES

TGSI ROUTE
The TGSI should be integrated with the BRT station layout and drop-kerbs.

The TGSI route along Buitenkant St should lead to Gardens Station and Darling or Castle Station along Darling St. The Parliament can be used as a fixed landmark for orientation by directing the TGSI route from Buitenkant St along Roeland Street.

BRT STATIONS
The MyCiti bus stations should be integrated with the streetscape with the accessibility features extending to the surrounding context.

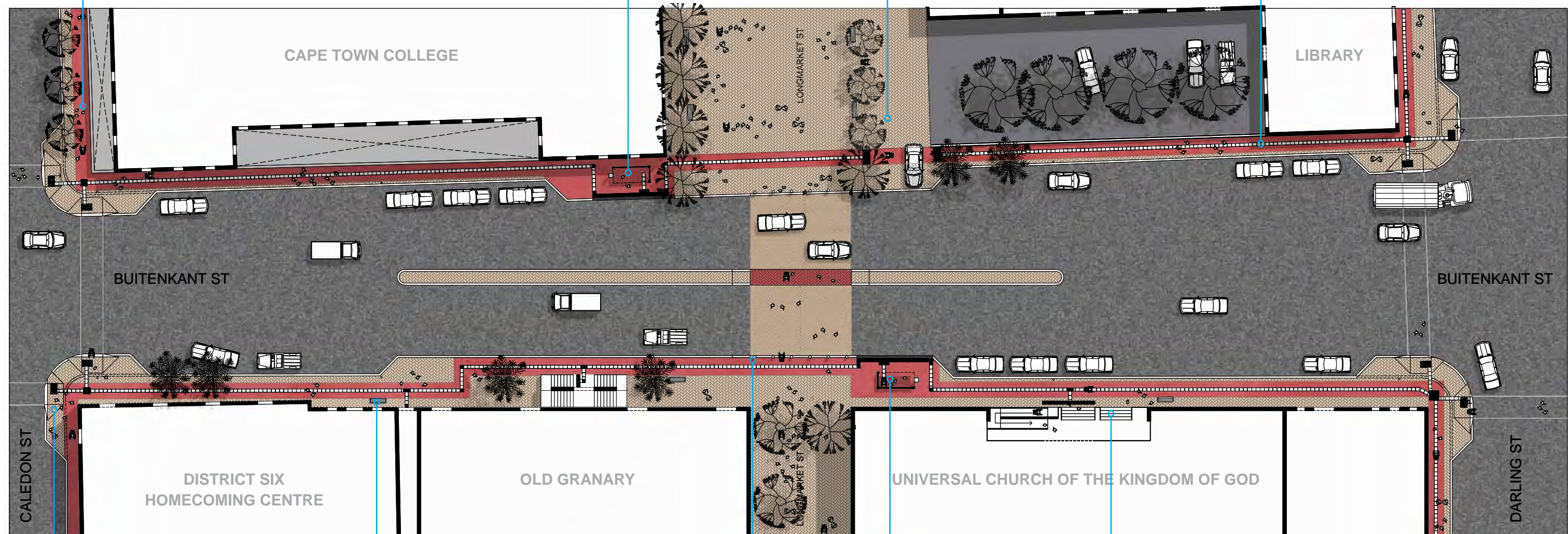
MATERIALITY

Surfacing material should be consistent throughout the precinct with high contrast to aid visually-impaired people.

Smooth surface material can aid non-motorised transport like skateboards and wheelchair.

ACCESSIBLE ROUTE

The accessible route should be at least 1500mm wide and unobstructed. The TGSI route should be in the centreline of the path of travel.
No furniture or planters should be part of this route.



SEATING
Pause spaces should be placed at 25m intervals along an accessible route.

DROP KERBS
Principles of good kerb ramp design to provide guidance for vision impaired pedestrians:
(a) The ramp grade should be oriented in the direction of travel.
(b) Ramps on both sides of a carriageway have to be aligned with one another and the direction of travel.



BOLLARDS
Bollards should be placed not less than 900mm apart. 1500mm spacing is ideal to accommodate the widest wheelchair and push-prams. Bollards and other street furniture should not be part of the accessible route.

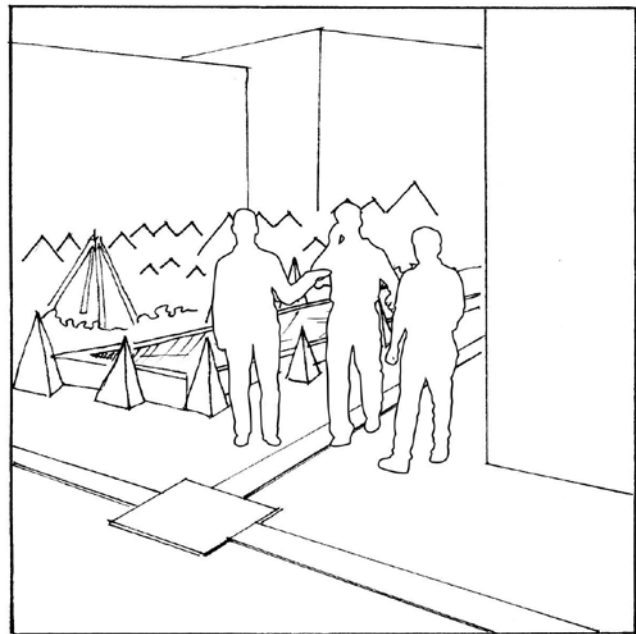
AUDIBLE TRAFFIC SIGNAL
Pause spaces should be placed at 25m intervals along an accessible route.



ENTRANCE
TGSI route should lead to the main entrance of a public building. Ramp should be provided if the entrance is not at street level. Talking signage can be integrate with the building's signage.

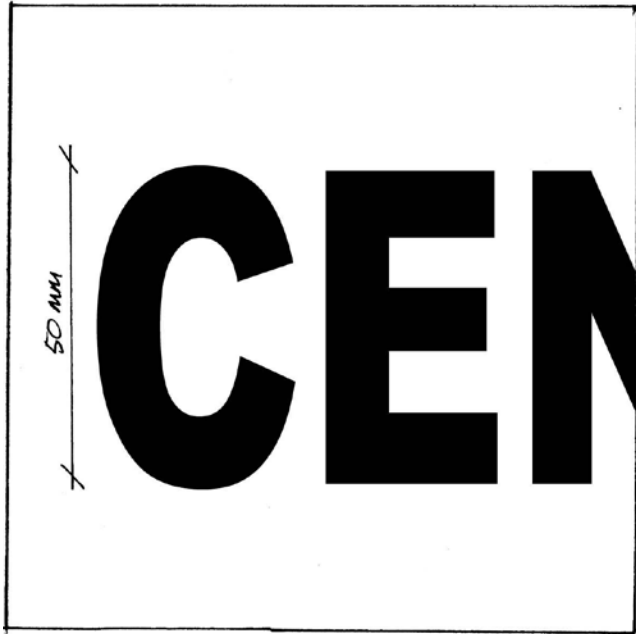
8.14. Proposed redesign of Lower Buitenkant St.

The width of pavement should be at least 3m wide to accomodate pedestrian movements, street furnitures and building's frontage zone.

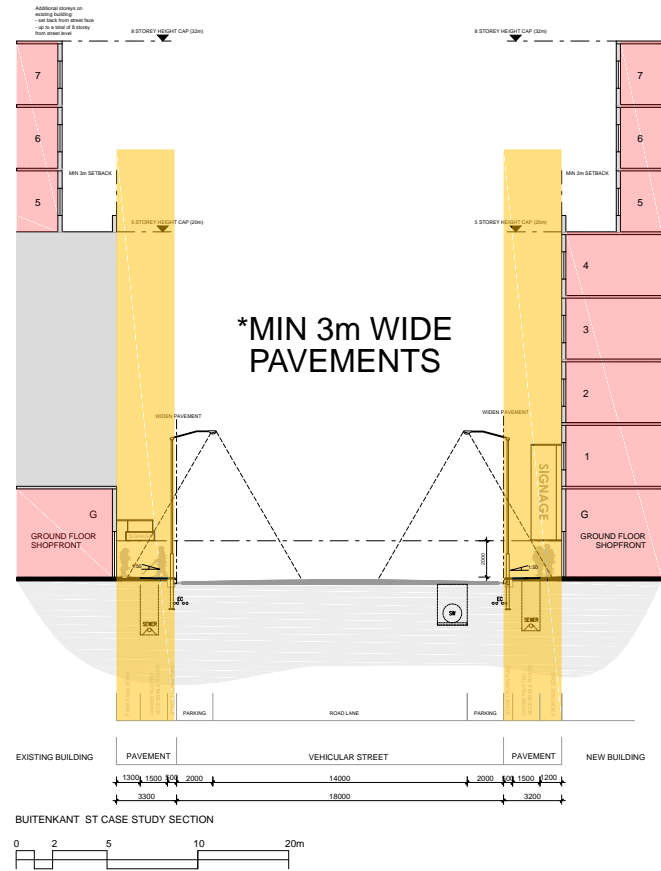


8.15. Clear width for visual communication.

Sigange should be clear with letterings at a minimum height of 50mm for visibility and viewing at a greater distance.

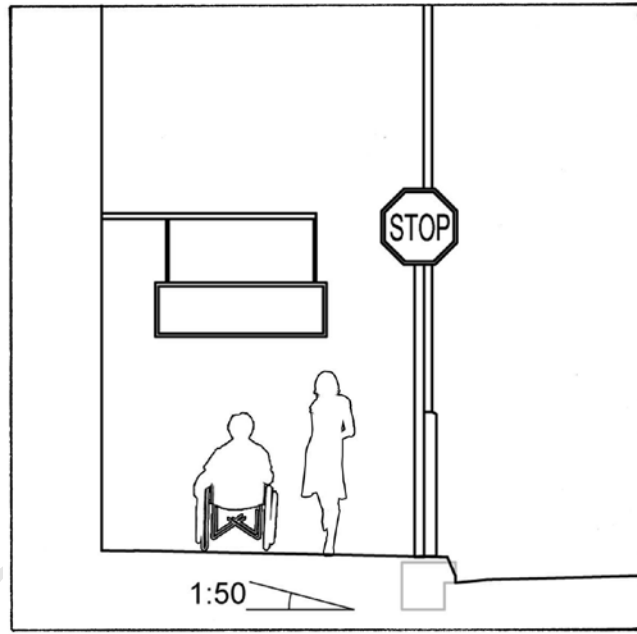


8.16. Minimum height for text in signage.



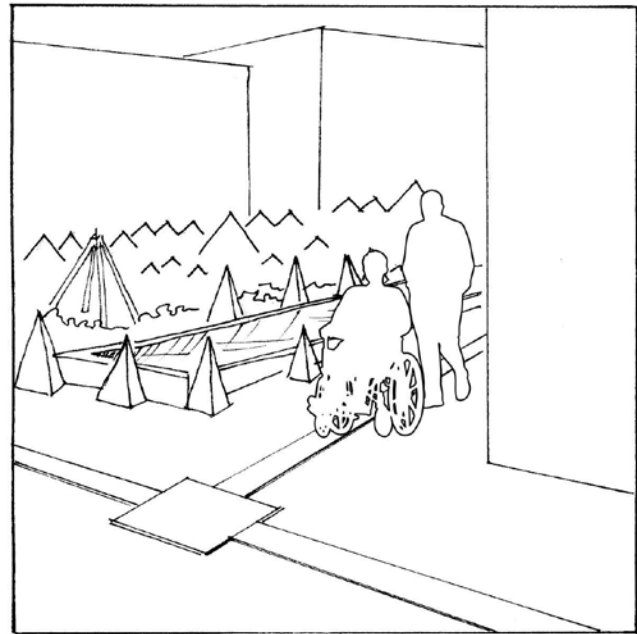
8.17. Accessibility guidelines in street section.

Height clearance for hanging signage, overhang, lights or object that protude into circulation space shall be at least 2.1 m. above trafficable surface.

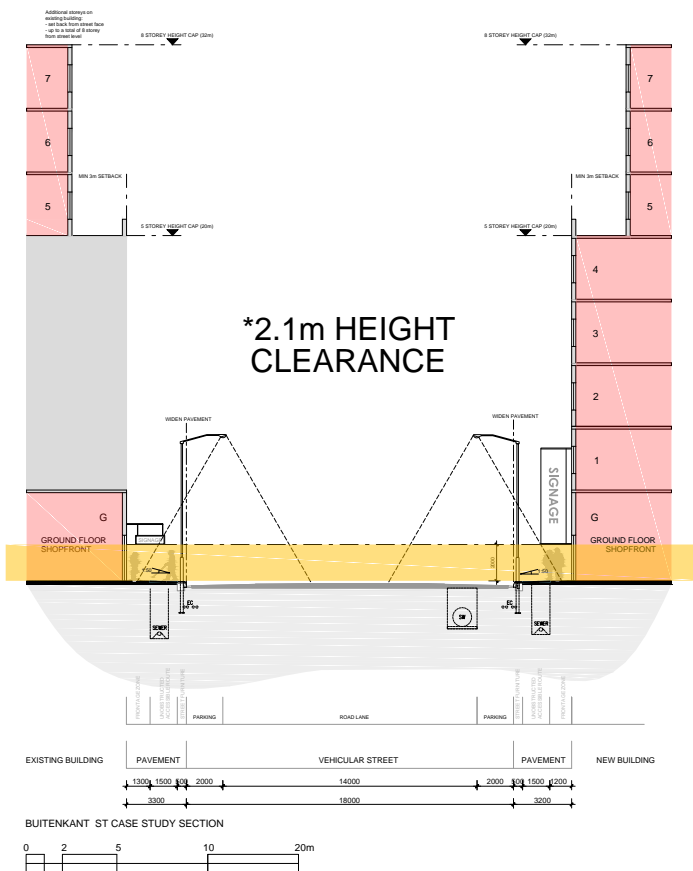


8.18. Minimum slope for pavement.

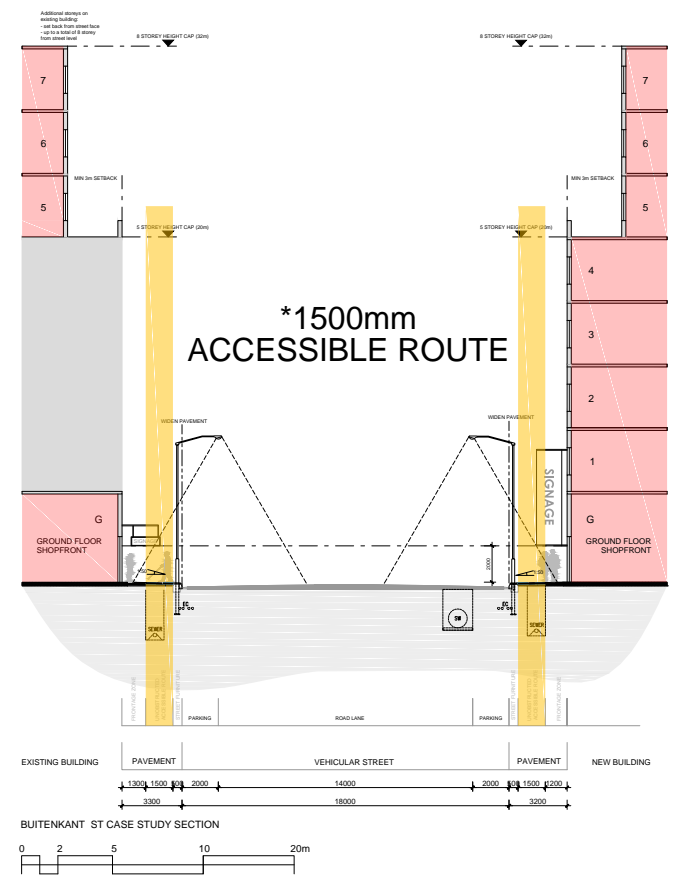
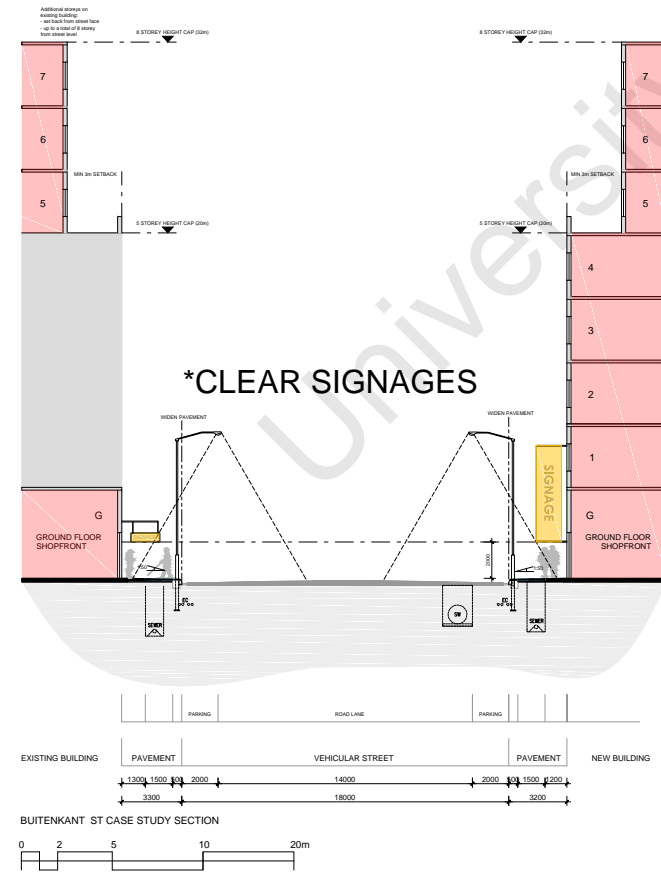
Accessible route for pedestrian movements and non-motorised transport shall be at least 1500mm wide with TGSi in the centreline.



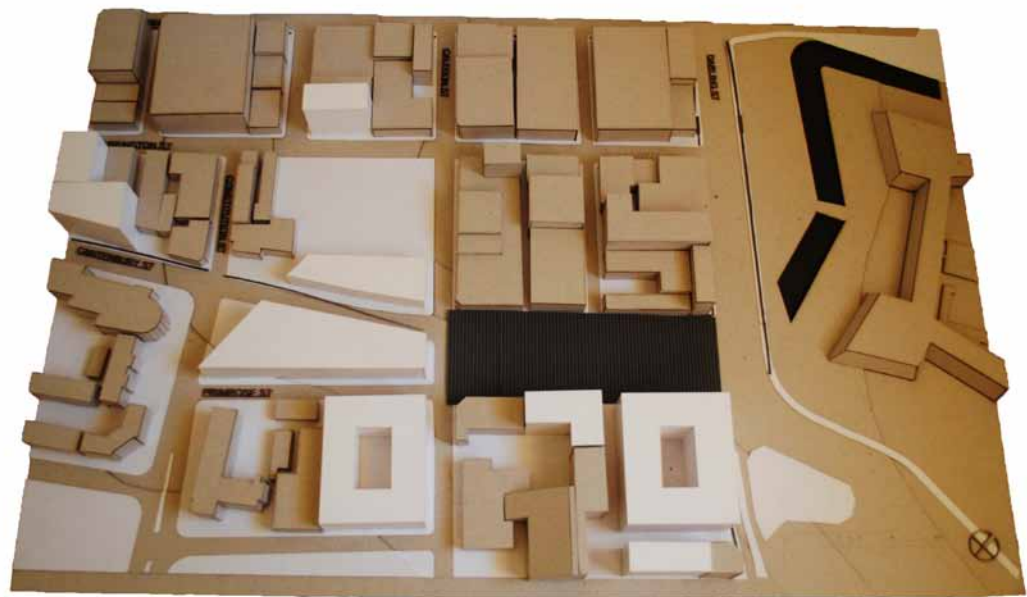
8.19. Unobstructed accessible route.



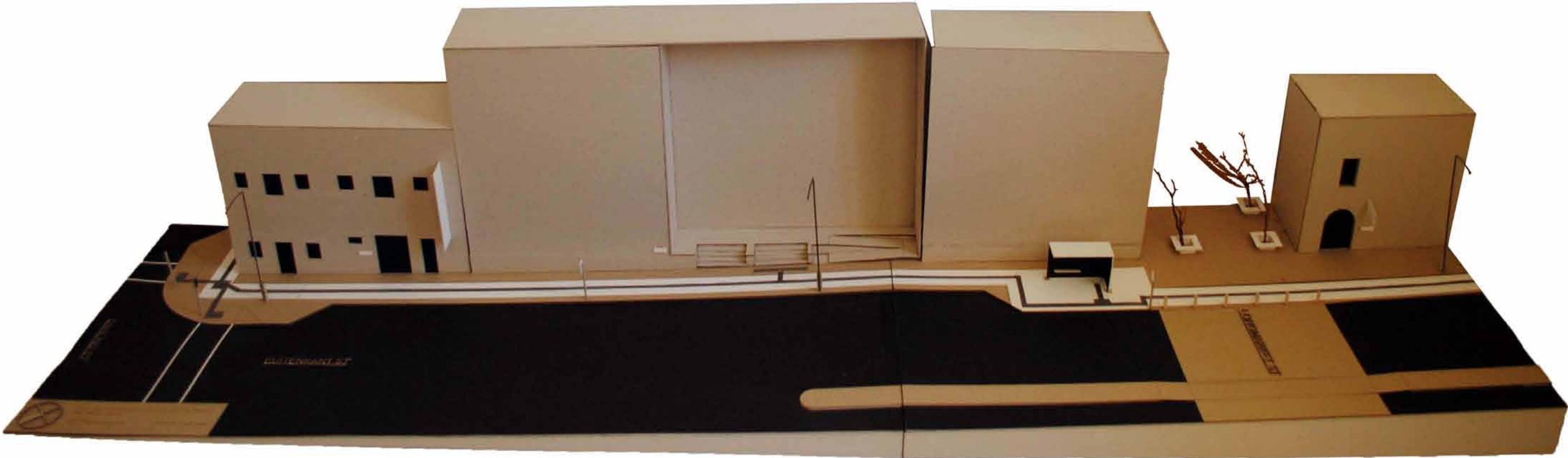
8.20. Accessibility guidelines in street section.



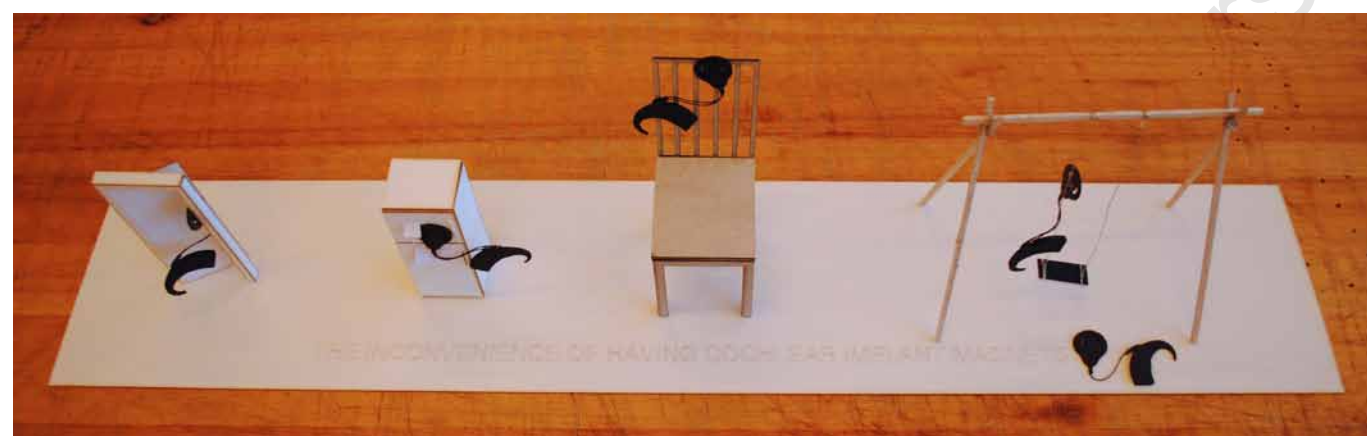
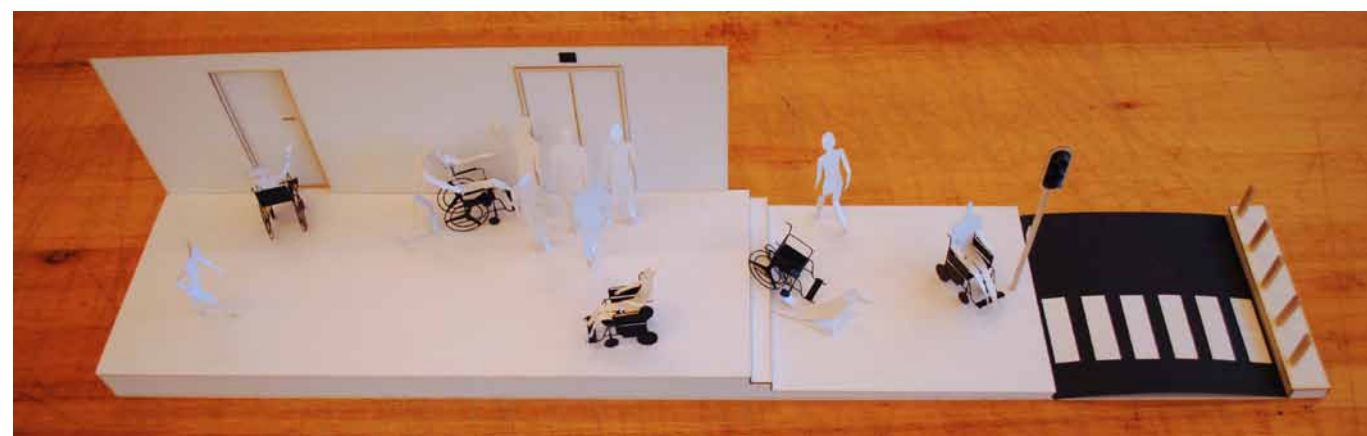
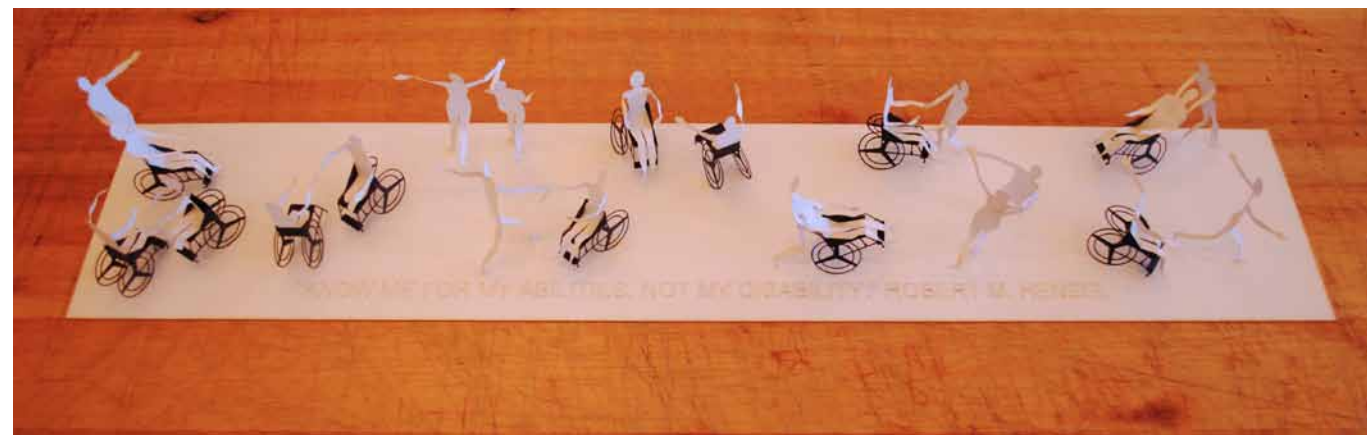
MODELS



8.21. Contextual model of the Fringe Precinct.



8.22. 1:50 scaled model of lower Buitenkant St as case study with accessibility features.



8.23. Exploration models.



8.24. Exploration models.

GLOSSARY

Accessible Architecture – architecture that is physically accessible and accommodating of disabled people's needs beyond the provision of ramps and wheelchair access.

Accessible Route – unobstructed path of travel with a minimum width of 1500mm for access, movement and turning.

Acoustic wedges – porous insulation material made of acoustic foam to absorb sound waves and reduce reverberations.

Anechoic Chamber – a soundproof room used in measuring the acoustic properties of materials and the sounds produced by objects and technologies.

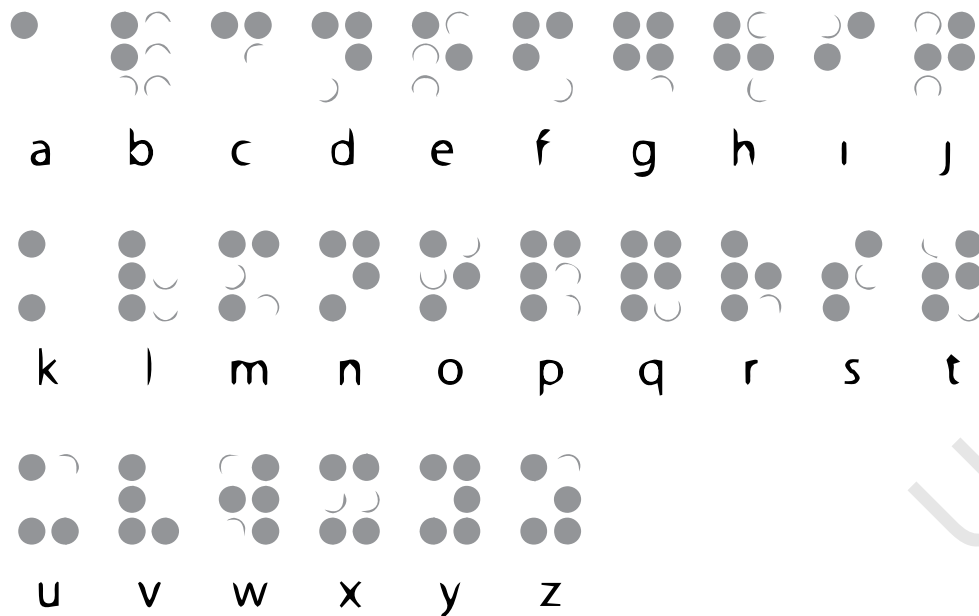
Anthropometric – the study of proportions and measurements of a human body. Anthropometric data is used as a starting point in investigating and designing spatial layouts and products for movements, distances and heights for functional accessibility.

Assistive technologies – technical devices used by disabled people to assist with their movement or overcome their limitations. Examples are guide sticks, hearing aids, wheelchairs, and walking aids to name a few.

Audible Traffic Signal – a device installed with traffic light system that aid sensory disabled people by indicating the time for safe crossing through vibration and clicking sounds.

Audiometric testing booth – a sound-proofed chamber used by audiologists to measure the hearing range of patients and test assistive hearing devices.

Braille – system of tactile writing or printing consisting of raised points that are interpreted by visually impaired people through touch.



Braille alphabets (courtesy of UCT Disability Services)

Change spot - a flooring tile with raised texture indicating change of direction along a path of travel to aid a blind person with orientation in a particular setting.

Communication – the exchange of information through languages, display of text, Braille, tactile communication, large print, signage language, accessible multimedia, human-reader as well as audio technology.

DeafSpace - a term developed in USA to describe an unique approach of deaf people toward spatial design by employing clear sight lines, circular arrangement of furniture, use of tactile elements and vibrations.

Disabled people– universally accepted term for people with a range of physical, sensory and cognitive disabilities. This term is interchangeable with “persons with disabilities” and “people with disabilities”.

Disabilist – a person who discriminates against people with disabilities based most often on their physical abilities.

Domino pro system – an assistive device used by the hearing impaired and cochlear implant users to provide clear speech sounds. It consists of a microphone to pick up sounds within a defined range and a receiver to transmit the sound to the assistive hearing devices.

Echolocation – the skill of locating the object and the associated qualities of size, height, and distance by reflecting sounds. Few blind people used it for orientation and detecting the environment.

Ergonomics – a discipline that focuses on the application of a human body to the design of a product or environment to maximise fit and comfort for more effective use.

Guide rail – technical feature fixed to a wall or along the length of a route to aid with blind people's sense of orientation.

Haptic – sensory experience through touch.

Inclusive Learning Environment – an environment that is physically accessible and accommodating of the needs of all students regardless of their disabilities, ability, gender, and races.

Language - includes spoken and signed languages and other forms of non-spoken languages

Loop system – An assistive feature used in conjunction with a Domino Pro System and installed in spatial setting for conversations. It is basically a copper wire running around the perimeter of a room connected to a microphone. A hearing-impaired or cochlear implant user can adjust the setting of assistive hearing devices to pick up the sounds transmitting through the copper wires.

Multi-sensory area – a room or therapeutic space designed deliberately to stimulate the senses and provide a unique perception or experience of space.

Nib – a minimum of 450mm wall space next to the handle-side of a door to allow a wheelchair user to open the door toward the wheelchair.

Occupational Therapy – a very broad medical field focusing on treatments of human health in relation to human activities, functions and the environments.

Phenomenology – the sensory experience of a space through the building material and its sensory properties.

Rehabilitative - to restore to good health and life through education and therapy.

SenseFloor - an innovative dance floor that convert sounds or music into vibrations by the use of vibrating mechanisms.

Sign Language – visual language using hand signs and facial expressions as communication medium.

Specialist equipment – medical, therapeutic or assistive equipment that address the needs of disabled people.

Tactility – term used to refer to the perception of architectural form and textured surfaces of materials through touch.

Talking signage - a verbal assistive technology that provide voice identification of landmarks and signage to aid visually impaired people with way-finding and orientation. A user scan the environment with a remote and receive a verbal feedback on streets, address or landmarks.

Text to speech software - a digital application used by the visually impaired people to navigate the digital world and “read” texts.

TGSI – Tactile Ground Surface Indicator. Tiles with raised texture to assist visually impaired people with orientation, direction of travel and location of fixture such as information desk or bus stations.

The Modular – theory developed by Le Corbusier on using the standard scale of human body and the Golden Section ratio (1.618) in creating a human scaled environment.

Turning space – a clear space of 1500mm radius to allow for 360° wheelchair rotation.

Universal Design – the concept and principle of designing all products and the built environment to be aesthetic and usable to the greatest extent possible by everyone, regardless of their age, ability, or status in life.

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Interviewee 4. Trainee at the Cape Town Society for the Blind. 2013. Interviewed by author. [Transcript] 19 March. Salt River, Cape Town.

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